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Record of Decision:

SAVANNAH RIVER SITE (USDOE)
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United States Department of Energy

Savannah River Site

Interim Action Record of Decision
Remedial Alternative Selection (U)

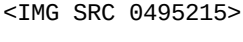
Par Pond Unit

WSRC-RP-93-1549
Revision 0
January 26, 1995

Westinghouse Savannah River Company

Savannah River Site

Aiken, South Carolina 29808



SAVANNAH RIVER SITE

PREPARED FOR THE U.S. DEPARTMENT OF ENERGY UNDER CONTRACT DE-AC09-89-SR18035

DECLARATION FOR THE INTERIM ACTION RECORD OF DECISION

Unit Name and Location

Par Pond Unit
Savannah River Site
Barnwell County, South Carolina

The Par Pond unit, consisting of the Par Pond Reservoir, the series of pre-cooler ponds and canals, and Lower Three Runs Creek, at the Savannah River Site (SRS), is listed as a Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) unit in Appendix C of the Federal Facility Agreement (FFA).

Statement of Basis and Purpose

This document presents the selected interim remedial action for the Par Pond operable unit, defined as the approximately 1340 acres of sediments at the periphery of the Par Pond Reservoir that were exposed as a result of the drawdown of the reservoir from 200 ft to 181 ft mean sea level (msl). The interim action was developed in accordance with CERLCA of 1980, as amended, and to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). This decision is based on the Administrative Record File for this specific CERCLA unit.

Assessment of the Unit

Par Pond is a 2640-acre man-made reservoir constructed to augment the cooling water requirements of both P and R Reactors of SRS. Releases in the form of process leaks, purges, and makeup cooling water have contaminated Par Pond sediments with cesium-137 and other radioactive and nonradioactive contaminants. During an inspection of Par Pond Dam in March 1991, a small surface depression was noted on the downstream face. Based on the inspection report, the U.S. Department of Energy (DOE) ordered a detailed structural investigation into the cause of the depression and simultaneously initiated a precautionary drawdown of the Par Pond Reservoir from the original 200 ± 1 ft to 181 ft msl. The 181-ft level was chosen to reduce the risk and consequences, in the unlikely event of a dam failure, of potential flooding in downstream communities. The drawdown resulted in exposure of approximately 1340 acres of previously submerged sediments contaminated with cesium-137 and other radioactive and nonradioactive contaminants.

Remedial alternatives were developed for interim remediation of the exposed sediments caused by the reservoir drawdown. The alternatives developed are based on limited existing information regarding the physical and chemical characteristics of the sediments of Par Pond and the hazardous substances within the sediment. DOE is conducting ongoing investigations of the Par Pond waste unit. The additional information being obtained is essential in developing technically effective remedial alternatives that would address all contaminated media and risk. Regarding the remediation/restoration of Par Pond, DOE is scoping a phased approach to identify the optimal sequence of investigative activities and unit actions. An interim action is initially being proposed to remediate the immediate potential risks caused by exposure of contaminated sediments due to reservoir drawdown including associated efforts upon the reservoir, due to erosion of exposed sediments. A CERCLA Remedial Investigation (RI) characterization is currently planned according to the FFA schedule.

Description of the Selected Remedy

The preferred interim alternative consists of refilling and maintaining Par Pond to the original 200 ± 1-ft level following repair of the Par Pond Dam. Based on comments on the Interim Action Proposed Plan for the operable unit, the preferred alternative has been modified to include maintenance of the reservoir at the 200-ft water level until a National Environmental Protection Act (NEPA) evaluation can be accomplished of the environmental impacts from reduced flow to Lower Three Runs Creek (the creek below Par Pond Dam), fluctuating reservoir water level, and the discontinuance of providing river water, through pumping, to the reservoir.

The preferred alternative is an interim action. A final action(s) will be evaluated following implementation of the preferred interim action alternative according to the FFA schedule. The interim action provides the most timely reduction of risk to human health and the environment

through submergence of the sediments with a layer of water upon restoration of the Par Pond water level. The water layer would attenuate gamma radiation emitted from the decay of cesium-137 and minimize the potential for sediments to become airborne. Also, of significance to the environment, the interim action would allow for a gradual recovery of the reservoir to essentially pre-drawdown ecological conditions.

Declaration Statement

The interim action remedy is protective of human health and the environment, complies with Federal and South Carolina applicable or relevant and appropriate requirements (ARARs) directly associated with this limited scope action, and is cost-effective. This interim action utilizes permanent solutions and alternative treatment (or resource recovery) technologies, to the maximum extent practicable, given the limited scope of the action. Because this action does not constitute the final remedy for the Par Pond unit, the statutory preference for remedies that employ treatment that reduces toxicity, mobility, or volume as a principal element, although partially addressed in this remedy, will be addressed by the final response action(s). Subsequent actions are planned to address fully the threats posed by the conditions at the Par Pond unit. Since this is an Interim Action Record of Decision, review of this unit and of this remedy will be ongoing through implementation of the Remedial Investigation and Feasibility Study process required in accordance with the terms of the FFA as DOE, the U.S. Environmental Protection Agency, and the South Carolina Department of Health and Environmental Control continue to develop final remedial alternatives for the Par Pond unit.

Date

Frank R. McCoy
Assistant Manager for Environment,
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Date

John H. Hankinson, Jr.

Regional Administrator
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Date

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Environmental Quality Control
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DECISION SUMMARY
TABLE OF CONTENTS

List of Figures

List of Tables

Appendix

I. Site and Operable Unit Name, Location, and Description

The Savannah River Site (SRS) occupies approximately 300 square miles of land adjacent to the Savannah River, principally in Aiken and Barnwell Counties of South Carolina (Figure 1). SRS is a secured U.S. government facility with no permanent residents. The Site is located approximately 25 miles southeast of Augusta, Georgia, and 20 miles south of Aiken, South Carolina. According to 1990 census data, the average population densities (in people/square mile) for the surrounding South Carolina counties are 111 for Aiken County, 36 for Barnwell County, and 28 for Allendale County, and for the surrounding Georgia Counties are 228 for Columbia County, 524 for Richmond County, 25 for Burke County, and 21 for Screven County. The population within a 50-mile radius of SRS is 635,000 people.

SRS is owned by the U.S. Department of Energy (DOE). Management and operating services are provided by Westinghouse Savannah River Company (WSRC). SRS has historically produced tritium, plutonium, and other special nuclear materials for national defense. SRS has also provided nuclear materials for the space program and for medical, industrial, and research efforts. Chemical and radioactive wastes are by-products of nuclear material production processes. Hazardous substances, as defined by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), are currently present in the environment at SRS. The Par Pond unit, consisting of the Par Pond Reservoir, the series of pre-cooler ponds and canals, and Lower Three Runs Creek, is listed as a CERCLA unit in Appendix C of the Federal Facility Agreement (FFA, 1993). For the purposes of this interim action, the operable unit addressed consists of the approximately 1340 acres of sediments at the periphery of the Par Pond Reservoir that were exposed as a result of the drawdown of the reservoir from 200 ft to 181 ft mean sea level (msl).

Par Pond is a 2640-acre man-made reservoir located northeast of P Area and east of R Area in the eastern portion of SRS (refer to Figure 1).

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<IMG SRC 0495215B>

Par Pond was created in 1958 by constructing an earthen dam across Lower Three Runs Creek. The three main arms of the reservoir follow the uppermost portion of Lower Three Runs Creek and its former tributaries, Poplar Branch and Joyce Branch (Wilde and Tilly, 1985). Prior to drawdown, the elevation of Par Pond was 200 ± 1 ft msl. The current elevation after drawdown is 181 ft msl. Prior to drawdown, Par Pond had a mean depth of approximately 20 ft, a maximum depth of approximately 60 ft near the Par Pond Dam, and a shoreline length of approximately 38 miles (Wilde, 1985).

The easternmost shore of Par Pond lies approximately 1.5 miles from the eastern SRS boundary. The southern shore of the reservoir lies approximately 200 ft north of Road B. Par Pond discharges through controlled releases into Lower Three Runs Creek, which in turn discharges into the Savannah River. The length of Lower Three Runs Creek from the outfall of Par Pond to the Savannah River is approximately 20 miles.

II. Operable Unit History and Compliance History

Operable Unit History

Par Pond was built to augment the cooling water requirements of both P and R Reactors (Wilde, 1985). R Reactor began operations in 1953. Prior to construction of Par Pond, R Reactor received cooling water directly from the Savannah River and discharged cooling water directly into Lower Three Runs Creek in an area that is now the Hot Arm of Par Pond (Figure 2). P Reactor began operations in 1954. Prior to construction of Par Pond, P Reactor received cooling water directly from the Savannah River and discharged cooling water directly into Steel Creek.

During the late 1950s, an effluent pathway was constructed from R Reactor to Par Pond. The pathway consisted of the R Canal and Pond B (Figure 2). This effluent pathway was used for R Reactor discharge from 1961 until the reactor was shut down in 1964. Since the shutdown of R Reactor in 1964, R Canal and Pond B have remained mostly undisturbed. Par Pond

also served as a heat exchange/cooling reservoir for P Reactor until 1988. Heated water from P Reactor was released through a series of manmade canals and smaller impoundments into the pre-cooler Pond C. The effluent from Pond C passed through a concrete culvert below an earthen dam (the Pond C Dam) and was funneled by gravity into the Hot Arm of Par Pond.

Releases in the form of process leaks, purges, and makeup cooling water have contaminated Par Pond with cesium-137 and other radioactive and nonradioactive contaminants. Between 1954 and 1964, approximately 222 curies of cesium-137 were released from R Reactor into Par Pond or Lower Three Runs Creek (before the creation of the reservoir in 1958). All radioactive isotope releases ceased following the shutdown of R Reactor in 1964. No measurable cesium-137 was released into Par Pond from P Reactor (Wilde, 1987). Concentrations of radioactive isotopes in Par Pond have decreased due to the cessation of reactor releases, decay of the isotopes, dilution from groundwater seepage, and seepage losses from the basin. Since most of the radionuclide releases to Par Pond (directly or indirectly) occurred during the 1950 to 1960 era, and the half-life of cesium-137 is approimately 30 years, more than half of this radionuclide has decayed. The current estimated inventory of cesium-137 associated with all sediments within the Par Pond reservoir is approximately 43 Ci (Winn, 1993), of which 9 Ci are present in the 1340 acres of exposed sediments. The remaining 68 Ci of cesium-137 inventory in the Par Pond system is located in the sediments of the pre-cooler canal/pond system and Lower Three Runs Creek.

Mercury has been detected in fish from the Savannah River and SRS waterbodies since the analyses began in 1971, with comparable concentrations measured in onsite and offsite fish (WSRC, 1991a). It had been assumed that much of the mercury detected in onsite fish reflected mercury present in Savannah River water which originated primarily from industrial releases upriver from SRS. This water has been used as cooling water in site facilities and then discharged to SRS streams and lakes.

Since 1989, concentrations of mercury in fish collected at all locations onsite have been higher than fish collected from the Savannah River (WSRC, 1991a). Therefore, concentrations of mercury may not be totally attributable to offsite sources. SRS is currently investigating possible causes for these increased concentrations.

Since 1980, the Par Pond Dam has been inspected every other year. In addition to these inspections, wet areas near the downstream slope of the embankment have been inspected annually (DOE, 1992). During an inspection of the Par Pond Dam in March 1991, a small surface depression was noted on the downstream face. Based on the inspection report, DOE ordered a detailed structural investigation into the cause of the depression and simultaneously initiated a precautionary drawdown of the reservoir. From June through September 1991, the level of Par Pond was lowered from 200 ± 1 ft to 181 ft msl. The 181-ft level was chosen to reduce the risk and consequences, in the unlikely event of a dam failure, of potential flooding in downstream communities.

Limited studies have been conducted to evaluate the ecological effects of the continuing drawdown of Par Pond (DOE, 1993). Results of these ongoing studies are summarized below.

Lowering the surface water level elevation of Par Pond from a full pool of approximately 200 ft to 181 ft msl resulted in a reduction of the reservoir's surface area and volume by approximately 50 to 65 percent, respectively. This action caused many changes in what had been a formerly hydrologically stable and biologically productive ecosystem (Whicker et al., 1993). The drawdown of the reservoir had two major repercussions: (1) the elimination of the previous littoral (shore) zone and its interrelated communities, and (2) the exposure of sediments contaminated particularly with radiocesium and mercury. All components of the Par Pond ecosystem are continuing to undergo a period of disequilibrium associated with a readjustment to new conditions within the basin. The ecosystem is recovering, but at much reduced population sizes compared to full pool.

The loss of approximately two-thirds of the original volume of Par Pond and exposure of 1340 acres of lakebed sediment resulted in temporary impacts to the reservoir's water quality. Effects of the increased erosion and sediment resuspension from the exposed lakebed caused an increase in turbidity of the reservoir's water column. Erosion gullies up to approximately 11 inches deep were cut by individual rainstorm events during the fall of 1991 and the winter of 1991-1992 because of the initial lack of vegetative cover on the exposed lakebed (Whicker et al., 1993). However, colonization of the former lakebed by terrestrial and semi-aquatic plant species has stabilized much of the exposed sediment, thereby reducing the impacts of erosion and runoff. As a result of this reduction in the sediment load into the basin, the turbidity has decreased significantly compared to that immediately following the drawdown, and water clarity is presently similar to pre-drawdown conditions.

The dissolved ion concentrations in Par Pond were historically maintained as a result of a history of recirculation, evaporation, and Savannah River water inputs. The termination of pumping make-up water from the Savannah River has resulted in a decrease of ions to the Par Pond ecosystem. The conductivity of the surface waters was reduced from approximately 80-100 μmhos/cm to 30 μmhos/cm by the drawdown. After the drawdown, the relatively large influence of groundwater and natural surface inputs, which are very low in dissolved ions, began to dominate the water chemistry of the basin (Whicker et al., 1993). Associated with these reduced dissolved ion concentrations, increased levels of radiocesium have been found in muscle of largemouth bass suggesting increased biological mobility of radiocesium and possibly other contaminants in the reservoir (Whicker, 1991; DOE, 1993).

Approximately 1.5 square miles of submergent/ emergent wetland vegetation were lost as an immediate result of the drawdown of Par Pond. However, a number of species of aquatic plants have colonized the new littoral zone and shallow areas of the reduced area of the reservoir. This vegetation reestablishment was both rapid and extensive. The revegetation of the protected coves was more extensive than in open, wave-washed areas. Most of the new shoreline was colonized by either emergent or submergent aquatic vegetation. Eurasian watermilfoil, water-lily, slender naiad, and cattail were the four most common species (Whicker, 1992a).

The exposed sediments have exhibited a rapid vegetative colonization similar to that observed in some new shoreline habitats. The most common terrestrial plant species, in descending order of percent cover, are bog rushes, maidencane, bulrush, dog fennel and a sedge species (Whicker, 1992a). The colonizing vegetation on the exposed sediment is a mix of wetland and old-field plants, depending on soil moisture. Moisture varies with distance from the new shoreline, topography, soil type, and the presence of seeps.

Garden plot studies involving the propagation of cultivated plants on the exposed sediments were undertaken to evaluate the rate of radiocesium mobilization into food crops. Based on these studies, the uptake of radiocesium is extremely high for the amounts of that radionuclide available in the soil. This also would be expected to be reflected in the tissues of those animals species which forage on this successional vegetation (Whicker, 1992a; 1992b).

One of the most noticeable impacts resulting from the exposure following the drawdown of the reservoir was the decimation of many beds of freshwater mussels and clams (Whicker, 1991; DOE, 1992). However, current observations on Par Pond indicate that these populations appear to be recovering in the reduced area reservoir.

Par Pond fish populations were temporarily reduced as a result of the drawdown. The absence of an established littoral zone was expected to have the potential for a total loss of recruitment, because of reduced spawning and nursery habitat. In general, although recruitment was reduced during 1992, limited sampling data indicate that most species, including some short-lived forage species, experienced some recruitment. This occurred

in spite of the loss of the original littoral zone and probable intense predation.

As noted previously, the conductivity of the water in the Par Pond Reservoir has decreased following the drawdown and termination of the pumping of make-up water from the Savannah River. As the potassium ion decreases in availability, organisms take up more radiocesium, which is a potassium analog and more readily available in this now potassium-poor water. The impact of this has been observed in the increasing body burden of radiocesium in Par Pond largemouth bass. Other fish species would be expected to have similar concentrations (Whicker et al., 1993).

There is no evidence that the drawdown adversely affected the winter survival of adult alligators in Par Pond. Unfavorable conditions for nesting, and habitat conditions (lack of cover) that have undoubtedly resulted in the low survival of juveniles, have probably been the most important impacts of the reservoir drawdown on this resident alligator population.

In general, the waterfowl use of Par Pond during the wintering season has been reduced due to the physically smaller area and reduced food resources. The numbers of birds overwintering on the reservoir during the second year following the drawdown had increased compared to the winter of 1991; however, these numbers are still below pre-drawdom levels. This increase in the waterfowl numbers is at least in part due to the recovered levels of the aquatic macrophyte and invertebrate populations in the basin. In addition, the radiocesium body burdens in the ducks increased during the second winter with forty percent of the adult birds having measurable levels of radiocesium.

Substantial numbers of mourning dove have been observed foraging on the vegetation which has colonized the exposed lakebed. Concern for the potential off-site transport of contaminants by these birds prompted an analysis of birds found feeding on the terrestrial plants inhabiting the old lakebed versus birds collected off-site. These studies have shown that there are detectable levels of both mercury and radiocesium in the birds foraging on the exposed lakebed; however, these body burden levels do not pose a concern for human consumption at this time. Although there is no evidence of harm to wildlife from uptake of Cs-137 or mercury, there has been a noticeable increase in the uptake of cesium in some of the animals and vegetation on the sediments. The uptake levels have not yet reached a dose level where harm to wildlife will occur. The longer wildlife is exposed or can be exposed to the sediments, the greater the uptake of contaminants will be and the greater the risk of physiological harm becomes. Wildlife monitoring will continue.

Par Pond has been and continues to be the location where most sightings of bald eagles on the SRS takes place (Mayer et al., 1985; 1986; WSRC, 1993). Observations of both adult and immature birds on Par Pond have continued to be infrequent but persistent. In general, the use of the reservoir by bald eagles has been for both foraging and roosting activities. The drawdown has had no noticeable impact on the bald eagle use of Par Pond. It is assumed that most of the prey obtainedby breeding adults and newly-fledged immatures is obtained in and around Par Pond. The impact of the use of Par Pond prey (primarily largemouth bass) by both adult and immature bald eagles is unknown at this time.

The sightings of golden eagles on the SRS continue to be a rare event. There have been no more observations of this species using Par Pond since the sightings during the winter of 1991 (WSRC, 1993).

Compliance History

At SRS, waste materials are managed which are regulated under the Resource Conservation and Recovery Act (RCRA). Certain SRS activities have required Federal operating or post-closure permits under RCRA. SRS received a hazardous waste permit from the South Carolina Department of Health and Environmental Control (SCDHEC) on September 30, 1987. Part V of the permit mandates that SRS establish and implement a RCRA Facility Investigation (RFI) Program, to fulfill the requirements specified in Section 3004(u) of the Federal permit. On December 21, 1989, SRS was

placed on the National Priorities List (NPL). A site placed on the NPL comes under the jurisdiction of CERCLA. In accordance with Section 120 of CERCLA, DOE has negotiated a FFA with the U.S. Environmental Protection Agency (EPA) and SCDHEC to coordinate cleanup activities at SRS into one comprehensive strategy that fulfills RCRA Section 3000(u) and CERCLA assessment, investigation, and response action requirements. The Par Pond unit is listed as a CERCLA unit in the FFA.

On July 17, 1991, DOE notified EPA-Region IV and SCDHEC that possible dam failure at Par Pond could be an imminent and substantial endangerment to public health, safety, and the environment under CERCLA, Section 104 (WSRC, 1991). DOE and EPA viewed the drawdown of Par Pond as a removal action under Section 300.415 (d)(3) of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). Subsequent evaluations indicated that repair activities to stabilize the dam were necessary (Bechtel, 1991). As a result, DOE determined that the appropriate action to ensure safety was to maintain the reservoir at the 181-ft elevation. This action would facilitate repairs and reduce potential for impacts to downstream communities in the unlikely event of a dam failure. Repair of the dam was approved under a CERCLA 106 Abatement Action Letter (WSRC, 1991). In conjunction with the technical evaluation of needs for the dam, DOE performed several environmental analyses including a Special Environmental Analysis for Par Pond at the Savannah River Site (DOE, 1992), to comply with National Environmental Policy Act (NEPA) requirements and commitments, which evaluated the impacts of drawdown, repair of the dam, and refill back to the 200-ft level. As of July 1, 1994, the Par Pond Dam has been repaired and is considered safe to maintain the reservoir at pre-drawdown water levels.

An agreement was reached with EPA - Region IV for SRS, under the site evaluation process of CERCLA, to conduct a limited, qualitative human heath risk assessment concerning the sediments exposed from the drawdown of Par Pond (WSRC, 1992). This human health risk assessment identified potential for additional exposure and the need to evaluate alternatives for reducing that exposure. In addition, an assessment of environmental risks based on existing information was also performed (WSRC, 1992; DOE, 1993).

In addition to cesium-137, mercury has also been identified as a chemical of concern (COC) in Par Pond exposed sediments although the concentrations and extent of contamination have not been fully assessed. Ecological studies indicate potential threats from cesium-137 and mercury in the sediments to animal receptor species (WSRC, 1992).

For an interim action and as requested by EPA - Region IV, DOE evaluated interim action remedial alternatives to reduce potential risks associated with cesium-137 in the exposed sediments. Based on current data, the most critical concerns for evaluation of interim remedial alternatives for the Par Pond sediments are the control of risks due to cesium-137 contamination. An evaluation of alternatives to support a final action will be conducted following completion of this interim action and an RI/FS for the entire waste unit.

III. Highlights of Community Participation

Public participation requirements are listed in Sections 113 and 117 of CERCLA. These requirements include the establishment of an Administrative Record File that documents the selection of cleanup alternatives and provides for review and comment by the public of those alternatives. The SRS public involvement plan (DOE, 1994) is designed to facilitate public involvement in the decision-making processes for permitting, closure, and the selection of remedial alternatives. The SRS public involvement plan addresses the requirements of RCRA, CERCLA, and the National Environmental Policy Act (NEPA). Section 117(A) of CERCLA, 1980, as amended, requires the preparation of a proposed plan as part of the site remedial process. The Interim Action Proposed Plan for the Par Pond Unit (IAPP) (WSRC, 1994), which is part of the Administrative Record File, highlights key aspects of the assessment and investigation

phases of the remediation process and identifies the preferred interim action alternative for remediation of the Par Pond unit.

The Administrative Record File, which contains the information pertaining to the selection of the response action, was made available at the EPA-Region IV office and at the following locations:

U.S. Department of Energy
Public Reading Room
Gregg-Graniteville Library
University of South Carolina-Aiken
171 University Parkway
Aiken, South Carolina 29801
(803) 641-3465

Thomas Cooper Library
Government Documents Department
University of South Carolina
Columbia, South Carolina 29208
(803) 777-4866

Similar information was made available through the following repositories:

Reese Library
Augusta College
2500 Walton Way
Augusta, Georgia 30910
(404) 737-1744

Asa H. Gordon Library
Savannah State College
Tompkins Road
Savannah, Georgia 31404
(912)356-2183

The public was notified of the comment period for the IAPP through mailings of the SRS Environmental Bulletin, a newsletter sent to more that 1400 citizens in South Carolina and Georgia, and through notices in local newspapers including the Aiken Standard, The State, and the Augusta Chronicle.

The public comment period began on December 1, 1994 for the IAPP and ended on January 6, 1995. Responses to comments are discussed in the Responsiveness Summary (Appendix A).

A public meeting was held on December 14, 1994 in Aiken, South Carolina to discuss the selected interim action remedy. Written and oral comments were accepted during this meeting. These comments are addressed in the Responsiveness Summary (Appendix A).

IV. Scope and Role of Operable Unit within the Site Strategy

This interim action operable unit addresses only the remediation of approximately 1340 acres of sediments on the periphery of the Par Pond reservoir that were exposed as a result of reservoir drawdown (Figure 3). The overall strategy of remediating the Par Pond waste unit, consisting of the Par Pond reservoir, the series of pre-cooler ponds and canals, and Lower Three Runs Creek, is to: (1) perform the proposed interim action described herein; (2) further characterize the waste unit delineating the nature and extent of contamination and identifying the media of concern; (3) perform a quantitative baseline risk assessment to evaluate media of concern, chemicals of concern, exposure pathways and characterize potential risks; and (4) evaluate and perform a final action to remediate the identifled media of concern. The operable unit described in this Interim Action Record of Decision (IROD) does not include the submerged sediments in Par Pond, the series of pre-cooler ponds, or Lower Three Runs Creek. The discrete action of this operable unit constitutes the first of the proposed strategies which would address the immediate threats posed by the overall waste unit. The interim action would remediate the immediate potential risks caused by exposure of contaminated sediments due to reservoir drawdown. The action fulfills the qualitative interim remedial goals by providing the most timely reduction of risk to human health, and the environment through submergence of the sediments with a layer of water upon restoration of the Par Pond water level. The water layer would attenuate gamma radiation emitted from the decay of cesium-137 and minimize the potential for contaminated sediments to become airborne or to become further redistributed through erosion. Also, of significance to the environment, the interim action would allow for a gradual recovery of the reservoir to essentially pre-drawdown ecological conditions. Following the performance of this interim action, further

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characterization, and performance of the risk assessment, a final action(s) will be evaluated which would address residual risk or contamination for the entire waste unit.

V. Summary of Operable Unit Characteristics

The lowering of Par Pond from 200 ft to 181 ft exposed approximately 1340 acres of sediment on the periphery of the reservoir contaminated with radionuclides and nonradioactive contaminants. Data are limited for evaluation of human health and environmental risks associated with the exposed sediments. Sampling locations for data used in the limited, qualitative risk assessment of Par Pond sediments are identified in Figure 4. The limited, qualitative risk assessment identified 16 nonradioactive constituents in Par Pond sediments (Table 1). The risk assessment screening process resulted in the selection of five of these constituents, barium, beryllium, cadmium, chromium, and mercury, for further evaluation in the human health risk assessment. These chemicals generally exceeded background concentrations and thus warranted a risk evaluation. For the ecological risk assessment, mercury was selected as the focus because the levels of mercury found in the sediments suggested a potential hazard to biota living on the exposed sediments and in the associated aquatic communities, and because of its bioaccumulation and bioconcentration potential.

Four radionuclides, cesium-137, cobalt-60, plutonium-238, and plutonium-239, were detected in Par Pond sediments (Table 1). All of these radionuclides were considered as chemicals of potential concern in the human health risk assessment. However, for the ecological risk assessment, only cesium-137 was evaluated because it comprised the largest percentage of the radioisotope inventory, was present in the greatest concentration in the sediments, and because it has a tendency for bioaccumulation and bioconcentration.

Decay of cesium-137 is by beta particle emission (7%) and through barium-137 X-rays (low-energy gamma radiation, 85%). The X-rays resulting from the decay of cesium-137 associated with the exposed sediments pose the primary external radiation exposure route. In addition, exposed sediments containing cesium-137 (and other radionuclides) could potentially become airborne through wind or other natural activities. Inhalation of airborne sediments is also considered a potentially significant exposure route.

Since most of the radionuclide releases to Par Pond (directly or indirectly) occurred during the 1950 to 1960 era, and the half-life of cesium-137 is approximately 30 years, more than half of this radionuclide has decayed. The current estimated inventory of cesium-137 associated with all sediments within the Par Pond reservoir is approximately 43 Ci (Winn, 1993), of which 9 Ci are present in the 1340 acres of exposed sediments. The remaining 68 Ci of cesium-137 inventory in the Par Pond system is located in the sediments of the pre-cooler canal/pond system and Lower Three Runs Creek. The maximum concentration of cesium-137 in exposed Par Pond sediments is 656,640 pCi/kg (WSRC, 1992). The exposed sediments are contained in an area of approximately 1340 acres on the periphery of the Par Pond reservoir. The majority of the contamination is within the top one foot of the sediment (Whicker, 1991). This gives a volume of sediment potentially requiring remediation of approximately 2.2 million cubic yards.

VI. Summary of Operable Unit Risks

Human Health Risks

Existing human populations that potentially may be exposed to operable unit-related contaminants include residents living outside but near the eastern boundary of SRS or downstream in the Lower Three Runs Creek and Savannah River watersheds, trespassers who may enter the Par Pond area, and workers involved with ongoing activities at Par Pond. Exposure pathways through which human receptors could potentially be exposed include external exposure to radiation from exposed sediments, inhalation of airborne sediment particulates, and dermal contact with and ingestion of sediments. Lowering the level of Par Pond to 181 ft has exposed approximately

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Table 1. Maximum Concentrations of Chemicals in Par Pond Sediments Compared to Background Levels

Contaminant	Maximum Concentration	Background Levels
Aluminum	22,400 mg/kg	10,000-300,0001 mg/kg
Barium	500 mg/kg	1102 mg/kg
Beryllium	3.99 mg/kg	0.6222 mg/kg
Cadmium	2.37 mg/kg	<0.00012 mg/kg
Calcium	2040 mg/kg	7000-500,0001 mg/kg
Chromium	49.3 mg/kg	8.442 mg/kg
Copper	10.2 mg/kg	2-1001 mg/kg
Iron	30,500 mg/kg	7000-550,0001 mg/kg
Lead	9.33 mg/kg	2-2001 mg/kg
Magnesium	608 mg/kg	600-60001 mg/kg
Manganese	297 mg/kg	20-30001 mg/kg
Mercury	0.614 mg/kg	0.2892 mg/kg
Nickel	5.69 mg/kg	5-5001 mg/kg
Silver	0.0713 mg/kg	0.2932 mg/kg
Sodium	17.0 mg/kg	750-75001 mg/kg
Zinc	43.1 mg/kg	10-3001 mg/kg
Cesium- 137	656,640 pCi/kg	<20002 pCi/kg
Cobalt-60	770.0 pCi/kg	<40002 pCi/kg
Plutonium-238	4.09 pCi/kg	NA3
Plutonium-239	38.0 pCi/kg	NA3

Source: WSRC, 1992

1 Lindsay, W.L., Chemical Equilibria in Soils
2 Meyer's Branch Data
3 NA = Not available

1340 acres of sediments that were previously under water. If no remedial action is taken, this sediment would remain exposed. A limited risk assessment was conducted (WSRC, 1992), based on limited existing data to address the human health risks resulting from these exposed sediments and forms the basis of the current understanding of human risk for the remedial action alternatives.

The data were not collected to fulfill the strict data quality assurance and quality control requirements of a CERCLA baseline risk assessment (WSRC, 1992). Therefore this risk assessment evaluates the data by identifying current and future exposure conditions which provide a range of potential risks from exposure to Par Pond contaminants. In addition, the risk assessment only evaluates the contaminants identified from the existing data. Other contaminants may be present in the Par Pond sediments, but without a comprehensive sampling and analysis effort, the risks resulting from exposure to all contaminants cannot be adequately assessed.

Because of the qualitative nature of the risk assessment, attempts to model contaminant transport were considered inappropriate. Extrapolation of exposure point concentrations using data that were of a quantity and quality inappropriate for model input, was considered to introduce an unacceptable level of uncertainty in the modeling results. An exception to this approach was made regarding resuspension to air of sediments no longer covered by surface water, which was considered the pathway most likely to transport appreciable quantities of contaminants from Par Pond during the drawdown condition. For this pathway, modeling was conducted using existing data to estimate exposure con-centrations of cesium-137 for current off-Par Pond unit locations (Hamby 1991b; Marter and Carlton, 1991).

Carcinogenic risks from inhalation of airborne sediment particulates by residents outside SRS boundaries were found to not be a concern, as the estimated risk is less than the EPA target risk range of 1 x 10-6 (one excess cancer in one million people). As stated above, risks were not calculated for residential exposure (outside SRS boundaries) through ingestion of surface water containing resuspended sediments. However, estimates of the annual dose equivalent of cesium-137, noted during the drawdown of Par Pond, suggested that risk from this pathway would be negligible. Introduction of cesium-137 to Lower Three Runs Creek and the Savannah River through erosion of exposed sediments during refill is not likely to exceed the amount that was introduced during drawdown. The Par Pond Dam Reservoir Refill Plan calls for refilling the Par Pond by pumping water from the Savannah River to the Par Pond, using the existing P-Reactor intake piping and discharge canal, at rates of 80,000 to 160,000 gallons per minute (gpm). The plan will transfer 50,000 gpm down P-Discharge Canal to the Hot Arm, and the remainder will be pumped by reversal of normal flow through the Par Pond Pump House Station, located at the head of the South Arm (Figure 5). The potential for remobilization of contaminated sediments in the Par Pond drainage during refill has been calculated (Chen, 1994). Particular emphasis has been given to the potential for loss of contaminated sediments from Par Pond into Lower Three Runs Creek. Calculations show that sediments would not be resuspended at the Pond C Dam (Hot Dam) outlet to the Par Pond. Sediments would be resuspended around the Par Pond Pump Station area. However, most of the suspended sediment would settle before reaching the Par Pond Dam. A very small quantity of sediment might remain in suspension. Although some sediment may be released, the downstream impact from cesium-137 will be far less than that experienced during the drawdown. During drawdown, water was released at 240,000 gpm (versus 10,000 during refill) and the amount of cesium-137 and suspended solids amounted to a maximum of 8 percent of the drinking water standards.

Carcinogenic risks calculated for the current land use scenario indicate only one pathway, external exposure from sediment to the Par Pond unit worker, exceeds the EPA-established target risk of 1 x 10-6; the risk for this pathway is calculated to be 4 x 10-5, within the EPA

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target risk range. By managing work conditions and duration, this risk can be minimized.

Carcinogenic risks calculated for the hypothetical future Par Pond unit worker and future Par Pond unit resident exposed to Par Pond sediments indicate that risks exceeding the EPA-established target range of 1 x 10-4 to 1 x 10-6 are likely for these scenarios. Because of the hypothetical nature of the Par Pond unit resident scenario, the additional pathways that are identified by this scenario are not likely to be of concern in the immediate future. However, the results of this scenario do identify additional pathways of concern should the Par Pond unit resident conditions become a possibility.

The limited risk assessment indicated no adverse noncarcinogenic human health effects are likely from exposure to Par Pond sediments.

Environmental Risks

A limited, qualitative ecological risk assessment (WSRC, 1992) was conducted to determine the potential effect of exposure to contaminated sediment on the newly emerging (early-successional) terrestrial community inhabiting the 1340 acres exposed from the drawdown of Par Pond to 181 ft. Because the exposed contaminated sediments can erode into Par Pond, potential risks to the aquatic community also were addressed. The ecological risk assessment investigated only current conditions at Par Pond. Neither the impact from the drawdown on the Par Pond ecosystem nor the potential effect from selected remedial alternatives were evaluated.

Two biotic communities were assessed for exposure to contaminants in the exposed Par Pond sediments, an early-successional terrestrial community and the aquatic Par Pond community potentially exposed from erosion of the exposed sediments into the reservoir. Biota from both populations are potentially exposed to radionuclides and non-radioactive constituents. Of the four radionuclides known to be present in Par Pond sediments, only cesium-137 was addressed in this assessment. Cesium-137 comprised the largest percentage of the radionuclide inventory, had the greatest concentration in the sediments, and has a known propensity for bioaccumulation and bioconcentration. There were 16 non-radioactive constituents identified in the sediments of Par Pond, of which only mercury was chosen as a chemical of potential concern due to its tendency for bioaccumulation and bioconcentration.

Of the species known to inhabit or visit the exposed sediments of Par Pond and the Par Pond aquatic ecosystem, the following were chosen as receptor species for the assessment:

- Rare, threatened, or endangered species [bald eagle, wood stork, American alligator (due to similarity of appearance to an actual threatened or endangered species which can be considered threatened or endangered by comparison)]
- Potentially affected sport or commercial species (white-tailed deer, ring-necked duck, largemouth bass, bluegill, loblolly pine)
- Species that represent obvious and known toxicological endpoints for exposure (water lotus, water lilies, wild pig, brown water snake, slider turtle, American coot, bufflehead, horned grebe, lesser scaup, ring-necked duck, and ruddy duck)
- Species that control the community structure and function through predation (American alligator, largemouth bass, and wild pig)
- Species that demonstrate marked productivity and abundance (blackberry briar and rush)

All selected terrestrial animal species may experience possible ecological effects from exposure to cesium-137. In addition, the American alligator may experience adverse ecological effects from mercury exposure (WSRC, 1992).

All selected aquatic animal species may experience adverse ecological effects from exposure to mercury, while the bald eagle, wood stork, and American alligator also may experience possible adverse effects from cesium-137 exposure.

Results of the limited risk assessment indicate that cesium-137 and mercury levels in the exposed sediments potentially threaten the animal receptors that inhabit the Par Pond shoreline with maintenance of the reservoir at the 181-ft msl water level. However, little or no effects to either terrestrial or aquatic vegetation are expected to occur. Effects of cesium-137 and mercury contamination from the exposed sediments that are transported to the reservoir in runoff will be specific for each receptor species depending upon such factors as diet and metabolism. If significant loading of sediment to the reservoir was to occur, effects from cesium-137 are expected to be minimal. However, enhanced mercury loading into the basin, in addition to causing the potential for increased methylation processes, poses threats to the identified aquatic receptor species and the Par Pond ecosystem. This is especially true for the fish-eating protected species (i.e., bald eagle, wood stork, osprey, and American alligator).

Based on observations and field evidence (e.g., tracks and scats), the use of the exposed lakebed by a few species of mammals has continued since the drawdown. This primarily includes the wild pig and white-tailed deer. Both of these species are harvested during the fall public hunts on the SRS. Because of this, these mammals are a concern associated with the uptake of contaminants (e.g., radiocesium) through the human consumption of animals taken in the area around Par Pond. Increased levels of radiocesium concentrations in wild pig muscle over pre-drawdown levels has the contaminated sediments. Although higher than observed prior to the drawdown, these levels do not currently pose a concern for human consumption. Although there is no evidence of harm to wildlife from uptake of Cs-137 or mercury, there has been a noticeable increase in the uptake of cesium in some of the animals and vegetation on the sediments. The uptake levels have not yet reached a dose level where harm to wildlife will occur. The longer wildlife is exposed or can be exposed to the sediments, the greater the uptake of contaminants will be and the greater the risk of physiological harm becomes. Wildlife monitoring will continue. Extensive rooting in the lakebed sediments by the wild pigs around Par Pond began immediately after the drawdown and continues to be extensive. The drawdown appears to have facilitated the range expansion of the SRS wild pig population in the area of Par Pond. This range expansion would be expected to result in damage to areas which had not previously been subjected to depredation by this non-native spectes. In addition, it also brings the distribution of these animals closer to the SRS boundary, increasing the potential for the off-site transport of contaminants and harvest by local residents.

VII. Description of Alternatives

Remedial alternatives were developed for the Par Pond unit for the reduction of human health and environmental risk from cesium-137 contamination in the exposed sediments. In accordance with the NCP, the No Action Alternative was set forth as a baseline. The alternatives are as follows:

Alternative 1

No Remedial Action and Maintain Par Pond at the 181-ft Level

Alternative 2
Refill and Maintain Par Pond at the 200 ± 1-ft Level

The preferred alternative for the Par Pond unit is Alternative 2 - Refill and Maintain Par Pond at the 200 ± 1-ft Level

Alternative 1 involves no remedial action for the exposed sediments. Alternative 1 consists of leaving Par Pond at the 181-ft level. Alternative 2 involves refilling Par Pond to the original 200 ± 1-ft level and maintaining the reservoir at that level.

Alternative 1 - No Remedial Action and Maintain Par Pond at the 181-ft Level

Under Alternative 1, Par Pond sediments would be left in place and no remedial efforts would be conducted. Par Pond would remain at the 181-ft level, leaving 1340 acres of contaminated sediments exposed. Currently, approximately 10 cubic feet per second of reservoir water is discharged to Lower Three

Runs Creek to maintain biota communities in the creek. Because of current access controls at SRS, the potential human health impacts would be to Par Pond unit workers from external exposure to radionuclides in the sediments; ingestion of and dermal contact with the sediments; and inhalation exposure to airborne particulates inside SRS boundaries. These potential impacts can be controlled by management of work conditions and duration. Also, ongoing revegetation of the exposed sediments result in reduction in particulate materials becoming airborne. The wetland and aquatic habitats of the Par Pond ecosystem would not recover to pre-drawdown conditions. Instead, terrestrial habitat would eventually become fully established on the approximately 1340 acres of exposed sediment. Exposure of animal receptors to the contaminated sediments would continue. Further description of this alternative appears below.

Treatment Components. No treatment would be implemented.

Engineering Controls. No engineering controls would be required.

Institutional Controls. Access to SRS is controlled at primary roads by continuously manned barricades. Other roads entering the site are closed to traffic by gates or barriers. The entire SRS facility is surrounded by an exclusion fence, except along the Savannah River. The Site is posted against trespassing under state and Federal statutes. No additional/new controls would be instituted.

Ouantity of Waste. The contaminants are primarily located within the top one foot of sediments. Under Alternative 1, approximately 1340 acres of sediment would remain exposed until final action(s) is evaluated. Considering that the depth of contamination does not exceed one foot, the volume of contaminated sediment is approximately 2.2 million cubic yards.

Implementation Requirements. This alternative is readily implementable.

Estimated Construction and Operation and Maintenance Costs. No remedial costs are expected for implementation of this alternative. Dam repair costs are not addressed in this IAPP. Maintenance costs include pumping/ discharge costs to maintain the water level in Par Pond at the 181-ft level. This cost is estimated to be $280,000 annually. The cost is an incremental (estimated) cost (part of the total cost) associated with the operation of the Site Cooling Water Distribution System (river water system) that maintains water to Par Pond, L Lake, and the reactors. The river water system will remain in service, at this time, regardless of the action chosen for Par Pond. Therefore, SRS would still incur the cost associated with the operation of the pumps. A review of remedy must be conducted every five years, as required under the Superfund Amendments and Reauthorization Act (SARA). Costs include estimates of meetings with EPA every five years using current overhead, wages, and expenses. A present worth factor is applied to the cost at a discount rate of five percent. Inflation is considered to be zero percent. The present worth costs for pumping/discharge to maintain the reservoir water level and remedy review extended over a 30-year period would be, respectively, approximately $4,300,000 and $280,000, or a total of approximately $4,600,000.

ARARs Associated with the Considered Alternative. Applicable or Relevant and Appropriate Requirements (ARARs) are Federal and state environmental regulations that establish standards which remedial actions must meet. There are three types of ARARs: (1) chemical-specific, (2) location-specific, and (3) action-specific. This section sets forth major ARA associated with the remedial alternative.

There are no chemical-specific or action-specific ARARs associated with Alternative 1. The single location-specific ARAR associated with Alternative 1 is the Endangered Species Act (16 USC 1531 et seq.). The Act is intended to prevent the further decline of endangered and threatened species and to bring about the restoration of these species and their habitats. Section 7 of the Act requires consultation with the Department of the Interior regarding any action of a Federal facility that may impact endangered or threatened species.

The Department of Interior is a Natural Resources Trustee for SRS. As such, their advice is continuously sought and they are kept informed on environmental issues, including the proposed interim action at Par Pond. The Endangered Species Act is applicable to the interim action since endangered (bald eagle) and threatened [American alligator (due to similarity of appearance to an actual threatened or endangered species)] species utilize Par Pond. These predator species utilize the reservoir and could be adversely affected by the increased loading of contaminated sediments from runoff into the basin and subsequent uptake and accumulation by prey species (WSRC, 1992). Both species also can be adversely affected by preying on terrestrial animals living on the exposed contaminated sediments. The wood stork is not considered to be impacted by the interim action as this species does not regularly utilize Par Pond. During the initial stages of reservoir drawdown, wood storks were seen feeding on prey isolated in shallow pools formed along the shoreline by receding waters. However, subsequently as the water level dropped and the isolated pools dried out, the sloping shoreline became steeper in gradient and the habitat became unsuitable for use by wood storks. This species requires a shallow water habitat such as found in nearby Kathwood Lake. The Endangered Species Act is the only law or regulation that includes the potential impacts to individual organisms from exposure to chemicals in the exposed sediments. Other laws or regulations that deal with potential impacts to natural resources relate to physical disturbance rather than chemical effects. The proposed interim action does not include physical disturbance, and, accordingly are not ARARs. Floodplain management and wetlands protection regulations are not ARARs because the Par Pond reservoir is not itself a jurisdictional wetland. Jurisdictional wetlands are present in the original streambed of Lower Three Runs Creek below the Par Pond Dam (COE, 1987).

Alternative 2 - Refill and Maintain Par Pond at the 200 ± 1-ft Level

Alternative 2 involves refilling the Par Pond reservoir and maintaining at the 200 ± 1-ft level, submerging currently exposed sediments with water. The wetland and aquatic habitats of the Par Pond ecosystem would eventually recover to essentially pre-drawdown conditions. Because of the access controls at SRS, the only temporary exposure pathway would be to workers at the Par Pond unit directly exposed to the sediments. External exposure to radionuclides, ingestion of and dermal contact with sediments, and inhalation of airborne sediments would cease with the refilling of Par Pond.

Since its construction in 1958, the Par Pond reservoir on the SRS has historically been a highly productive and diverse ecosystem benefitting from the protection from disturbance afforded by its location on the SRS. In spite of contaminants introduced from SRS production reactor effluents (e.g., heat, radionuclide discharges) and Savannah River water (e.g., mercury), the reservoir ecosystem has shown high biological diversity and has been an important regional resource for waterfowl. Primary production in the reservoir has been stimulated by inputs of nitrogen and phosphorus from Savannah River water that was used to replace seepage and evaporative losses, and to maintain constant water levels.

The historic inputs of Savannah River water have resulted in the accumulation of chemical constituents in the basin. Mercury accumulation has been documented, and, while not documented, nitrogen and phosphorus accumulations are also expected to have occurred. These constituents have accumulated primarily in sediments and, to a lesser extent, in biota in the ecosystem. Similarly, inputs of radionuclide releases from R Reactor have accumulated primarily in the sediments.

The refilling of Par Pond will significantly mitigate the risks associated with direct exposure from contaminated sediments. Once refilled, the overlying water will effectively shield the gamma radiation emissions from the cesium-137. Additionally, potential risks from resuspension by wind, although currently low, will be eliminated. The rate at which this mitigation is achieved is solely dependent on the time at which the reservoir is refilled to its historic water level of 200 ft msl.

The refilling of the reservoir will represent a significant additional change for the Par Pond ecosystem and will have both transient and permanent effects, relative to current and previous conditions. The refilling action will result in three immediate stresses to the Par Pond ecosystem. Additional nutrients (nitrogen and phosphorus) will be introduced into the basin with Savannah River water. Significant portions of the nutrients currently in the exposed sediments and the vegetation growing on these sediments will also be remobilized into the water column following inundation. This influx of nutrients is expected to result in eutrophic to hypereutrophic conditions in the reservoir (i.e., exceptionally high algal abundance and possible shifts to undesirable algal species). Introduction of nutrients during the spring and summer months is expected to result in worse conditions than if these nutrients are introduced during the fall and winter months when water temperatures and light intensity are lower. The presence of nutrients introduced during the winter months and mobilization of nutrients from sediments and decaying vegetation during the growing season makes the development of eutrophic to hypereutrophic conditions unavoidable, but minimization of nutrient input during the spring and summer months may afford some mitigation for this condition.

A second stress will result from inundation of the vegetation on the exposed sediments. Decay of this vegetation will deplete dissolved oxygen in the overlying water. To the extent that the inundation and initial decay occurs during the winter months, this stress may be somewhat mitigated because decomposition rates will be lower, more oxygen will be available in the colder water, and oxygen requirements by fish and other aquatic organisms will be lower. Nevertheless, it is anticipated that the zone of oxygenated water will be significantly reduced during at least the first year following reservoir refill from late spring through early fall.

The third stress resulting from the refill will be habitat disruption. Over the three years of the drawdown, the littoral (shore zone) community has become reestablished in the reservoir, although at a much reduced size compared to historic conditions. This littoral zone supports aquatic plant, aquatic invertebrate, and fish communities that are dependent upon this shallow water habitat. Of particular importance is the use of this habitat for fish spawning and as a nursery area for juvenile fish. This habitat will be lost during the refill and full reestablishment of the littoral zone habitat will require several years following refill of the reservoir and stabilization of water levels.

Some mitigation of the potential impacts on fish populations can be obtained by stabilizing water levels during the fish spawning and nursery periods. By maintaining relatively stable water levels during the spring and summer, fish are expected to complete spawning and recruitment. Should the reservoir not achieve its final pool level during the initial period of refilling, the reservoir water level will be stabilized to maximize the chances for successful spawning during 1995. This will require careful attention to water inputs from the river water system because the ability to release water from the reservoir at intermediate water levels is severely limited when the reservoir is thermally stratified.

Refill will occur during the fall and winter using both river water inputs and natural inputs from rainfall and groundwater. River water inputs will be reduced or eliminated as necessary to ensure that dam safety requirements are not exceeded. Until the reservoir is refilled, discharges will be minimized throughout the year to those outputs required to maintain acceptable flows in Lower Three Run Creek (approximately 10 cubic feet per second); only under conditions where dam safety is jeopardized will discharges be increased above this rate. River water inputs may be restricted during the spring and summer months as dictated by ecological conditions. During heavy rainfall events in the spring and summer, modest increases in water level are not expected to have adverse ecological consequences. The minimum water level to be maintained through the spring and summer is approximately that attained in early April.

Following this approach, it is possible, and the intent is, that the reservoir will be refilled during the first winter and the risk minimized.

Should that not be the case, a significant reduction in risk associated with the cesium-137 contaminated sediments will still be achieved because the most highly contaminated of the exposed sediments will be inundated. If only a partial refill is achieved during the first winter, a relatively short period during the following fall should be required to complete the refill.

The potential for remobilization of contaminated sediments in the Par Pond drainage during refill has been considered. Particular emphasis has been given to the potential for loss of contaminated sediments from Par Pond into Lower Three Runs Creek. The potential for significant transport from the reservoir is considered to be low. During the refilling operation, water will be pumped into the through the river water distribution system to the Par Pond pumphouse and released into Par Pond. There is no reason to expect that significant radionuclide contamination exists in the piping system of the river water distribution system, so no radionuclide resuspension is expected to occur prior to release of this water into Par Pond. The intake structure at the pumphouse is configured with a concrete slab extending the width of the intake structure and approximately 100 ft into the reservoir beyond the headwall of the intakes (Wilde, 1985). This concrete slab is at elevation 190 ft msl and is therefore submerged at the current water level. The slab extends into the pumphouse at the same elevation at least as far as the pump intakes. Consequently, water that is released into the pumphouse flowing toward the reservoir encounters a run of great than 100 ft of flat concrete prior to entering the reservoir proper. It is anticipated that prior to encountering the contaminated reservoir sediments, most of the turbulent energy of this water will have dissipated, thereby reducing or eliminating its erosive potential. Should any contaminated sediments be resuspended near the pumphouse, the flow path from the pumphouse to the dam is approximately 2.5 miles. It is reasonable to assume that flow velocities are low over this flow path, and that flow is essentially laminar (as opposed to turbulent). Consequently, any sediments eroded near the pumphouse should be redeposited in the reservoir prior to reaching the discharge pipe at the dam.

The other major source of water for the Par Pond refill is releases into the P Reactor canal system. The primary releases of radionuclides into Par Pond occurred through drainages associated with the R Reactor drainages. These included a natural drainage from R Area into Pond C and the R Reactor canal system through Pond B into the north arm of Par Pond. These drainages will not be affected by flows associated with the refill action. Secondary contamination of the P Reactor canal system occurred as a result of cesium-137 mobilization by chemical cycling processes within Par Pond and the intake of P Reactor cooling water with low level contamination. The last significant radionuclide introduction Par Pond system occurred in 1963-64. It is reasonable to assume that the majority of resuspendable contaminated particulate matter introduced into the P Canal system has been flushed from the system during the subsequent nearly 20 years of high flows through the system from P Reactor. Therefore, only small amounts of contaminated resuspendable particles are expected to occur in the canal system.

The entry point of the P Canal into Pond C represents a depositional area. This could be a point of historic radionuclide accumulation and a potential source of resuspendable contaminated particles. As this area has not been evaluated for soil types or contamination levels, it should be assumed that resuspension of contaminated particles could occur at this area. The flow path from this area to the Hot Dam culvert is approximately 1/3 mile and it can assumed that this flow is non-turbulent, thereby facilitating settling of particles. However, the culvert from Pond C to Par Pond pulls bottom water from Pond C. Particles settling to the bottom of Pond C near the culvert can be assumed to remain in suspension passing through the Hot Dam because of the expected high water velocities and turbulence. Once entering Par Pond from Pond C, however, these particles should settle relatively rapidly. After an initial episode of high turbulence following exit from the Hot Dam culvert, it can be assumed that flow velocities are low and flow is essentially laminar. The

flow path from the Hot Dam to the cold dam release intake is approximately 2.7 miles. It is anticipated that, even with bottom release, most of the particles should have settled over this flow course.

Monitoring of the response of the dam to rises in water level will be conducted as well as ecological conditions in the reservoir and monitoring of water quality of discharges from the reservoir to Lower Three Runs Creek.

Monitoring of ecological conditions will occur at four locations in the reservoir that have been used in previous monitoring efforts. Water samples will be collected in the reservoir at two week intervals with analyses for ammonia, nitrate, total Kjeldahl nitrogen, total phosphorus, orthophosphate, chlorophyll-a, dissolved oxygen, and temperature. Top and bottom samples will be collected for all chemical analyses except as noted. Chlorophyll-a analyses will only be conducted for surface waters. Temperature and dissolved oxygen measurements will be conducted at approximately 1 m intervals from the surface to the bottom. Water samples will be qualitatively screened to determine relative proportions of major algal taxa. Water quality monitoring will continue into the early fall after most, or all, of the reservoir filling is completed.

Fish sampling will be conducted at least three times: prior to initiation of refill, in the spring during the refill, and in the fall following refill. Electrofishing will be the primary collection technique with data analyzed to evaluate fish community structure and recruitment. Fish samples will be collected for mercury and cesium-137 analyses; water and sediment samples will also be collected at the time of fish sampling for mercury analyses.

DOE, through an interagency agreement with the U.S. Geologic Survey (USGS), maintains a water level stage recorder in Par Pond and a stream flow monitoring station immediately downstream from Road B on Lower Three Runs Creek. Par Pond discharges will be monitored at, or near, SRS Road B, (see Figure 1) immediately downstream from the Par Pond dam to test for radionuclide releases from the reservoir during refill.

Water quality monitoring at the Par Pond discharge is currently conducted bi-weekly using composite samples collected over that period. Water samples from Lower Three Runs Creek are analyzed for gross-alpha, non-volatile beta, and tritium; strontium analyses are conducted on a monthly basis. Monitoring of water immediately downstream from the Par Pond Dam will be modified at the time when refill is initiated. Daily grab samples will be collected and analyzed for total suspended solids, gross alpha, non-volatile beta, tritium, and cesium-137. This sampling will continue for a period of two weeks following the initiation of refill. Should significantly elevated concentrations of radionuclides be detected, daily monitoring will be continued for a longer period of time. Following cessation of daily monitoring, bi-weekly sampling will be resumed with the same parameters as in the current program (cesium-137 will be added) being analyzed. Should the values for any of the monitored radiological parameters approach or exceed 50 percent of the drinking water standard during the refill, releases from the reservoir will be reduced or ceased until it can be determined that these target concentrations will not be exceeded.

Further description of this alternative appears below.

Treatment Components. The treatment in this alternative would be the submergence of the sediments with the refilling and maintenance of the reservoir at the 200 ± 1-ft level. This would allow the radioactive isotopes in the sediments to decay naturally, and would minimize human health risks because of limited access to the sediments under water. The layer of water would provide shielding which would attenuate radiation and prevent contaminated sediments from becoming airborne.

Engineering Controls. Controlled pumping to and discharge from Par Pond would be required to maintain the water level at 200 ± 1 ft.

Institutional Controls. Under Alternative 2, remaining risk would be controlled through institutional controls. Public access to areas within SRS is controlled by existing security

personnel and security equipment as discussed under Alternative 1. No additional/new controls would be instituted under this alternative.

Quantity of Waste. Considering that the depth of contamination does not exceed one foot and the area of exposed sediments is 1340 acres, the volume of waste is approximately 2.2 million cubic yards.

Implementation Requirements. No implement-ability concerns are associated with Alternative 2.

Estimated Construction and Operation and Maintenance Costs. Implementation of this alternative requires pumping for refilling and maintaining the reservoir at the 200 ± 1-ft level. Annual pumping costs for refilling and maintaining Par Pond at the 200 ± 1-ft level are estimated to be $360,000. The cost is an incremental (estimated) cost (part of the total cost) associated with the operation of the Site Cooling Water Distribution System (river water system) that maintains water to Par Pond, L Lake, and the reactors. The river water system will remain in service, at this time, regardless of the action chosen for Par Pond. Therefore, SRS would still incur the cost associated with the operation of the pumps. The pumping cost extended over a 30-year period at a discount rate of five percent would be approximately $5,500,000. Since the waste would remain in place, a review of remedy would be required every five years under SARA. Total present worth costs for implementing this alternative, including pumping and remedy review, are estimated to be approximately $5,800,000 over a 30-year period.

ARARs Associated with the Considered Alternative. There are no chemical-specific or action-specific ARARs associated with Alternative 2. Concerning location-specific ARARs, as with Alternative 1, the Endangered Species Act (16 USC 1531 et seq.) is applicable to Alternative 2. Refilling Par Pond will eliminate the additional accumulation of contaminated sediments in deeper basin areas caused by surface runoff on the exposed areas. Contaminant concentrations in basin sediments would be expected to be more evenly distributed under this alternative. Accordingly, over the long term, adverse effects on endangered and threatened species would be more similar to pre-drawdown conditions.

VIII. Summary of Comparative Analysis of Alternatives

The NCP [40 CFR § 300.430 (e)(9)] sets forth nine evaluation criteria that provide the basis for evaluating alternatives and selecting a remedy. The criteria are:

- overall protection of human health and the environment
- compliance with ARARs
- long-term effectiveness and permanence
- reduction of toxicity, mobility, or volume through treatment
- short-term effectiveness
- implementability
- cost
- state acceptance
- community acceptance

Overall Protection of Human Health and the Environment. Alternative 1 would not achieve any reduction in human health risks posed by the drawdown of Par Pond. Alternative 2 would provide a reduction in carcinogenic risk due to the shielding provided by the overlying surface water after refilling of the pond. In addition, Alternative 2 would eliminate direct exposure to the contaminated sediments.

Under Alternative 1, the ecosystem alteration and instability resulting from Par Pond drawdown would continue as the ecosystem adjusts to drawdown conditions. Alternative 1 would result in continued exposure to contaminated sediments and would permanently eliminate approximately 1340 acres of wetland and aquatic habitat present prior to drawdown of the reservoir. Implementation of Alternative 2 would result in eventual re-establishment of the aquatic habitat and wetlands to essentially pre-drawdown conditions.

Compliance with Applicable or Relevant and Appropriate Requirements (ARARs). No chemical-specific or action-specific ARARs are associated with either Alternatives 1 or 2. The

Endangered Species Act is the location-specific ARAR associated with the alternatives. Alternative 1 allows for the potential of increased adverse effects to endangered and threatened species through increased potential for sediment loading to the reservoir and subsequent uptake of accumulation in prey species. With implementation of Alternative 2, Par Pond will more closely resemble conditions for these endangered and threatened species that existed before drawdown.

Long-Term Effectiveness and Permanence. The magnitude of risk associated with Alternative 1 will decrease over time due to the natural decay of cesium-137. The ecosystem would eventually adjust to conditions of the 181-ft drawdown water level; however, the habitat on the majority of the 1340 acres of exposed sediments would be permanently altered to a terrestrial structure.

The magnitude of risks under Alternative 2 will essentially remain unchanged for the time required for dam repair and water level restoration. Upon completion of restoration of the water level under Alternative 2, risk due to direct exposure and inhalation of contaminated sediments would be minimized. The ecosystem would recover to essentially pre-drawdown conditions (wetlands and aquatic habitat) under Alternative 2, as compared to Alternative 1, maintaining the water level at the 181-ft level.

Reduction of Toxicity, Mobility, or Volume. Alternative 1 would not reduce the mobility of waste constituents. Contaminant uptake by mobile terrestrial animal species could result in migration of contamination away from Par Pond. The toxicity (in terms of radioactivity) and volume of cesium-137 would decrease over time by the natural radioactive decay process. Cesium-137 has a half-life of 30 years. Accordingly, the activity has decreased to approximately one-half the original concentration resulting from the process releases that occurred in the 1950s and 1960s. The activity will continue to decrease at this rate.

Alternative 2 would mimmize the airborne mobility of the contaminated sediments. In addition, offsite migration through terrestrial animal movements would be precluded. However, contaminant mobility through migration of waterfowl and predator animal species feeding on contaminated flora and animal prey could continue with both alternatives. As with Alternative 1, the toxicity and volume of cesium-137 would be reduced through radioactive decay. Gamma attenuation would occur through restoration of the water level.

Short-Term Effectiveness. Alternative 2 can be implemented immediately without increased risk to the community or workers. The alternative itself poses no adverse environmental impacts. In comparison to Alternative 2, Alternative 1 will not reduce risks from exposure to Par Pond sediments or provide lessening of environmental impacts for the effects of drawdown.

Implementability. Alternative 1 is readily implementable. Refill under Alternative 2 may need to be conducted in stages over time to prevent rapid sediment resuspension and decreases in dissolved oxygen content of the water column.

Cost. Repair of the dam was completed on July 1, 1994, conducted under the auspices of the Atomic Energy Act (AEA), and is not included in the evaluation of costs for the alternatives. Alternative 1 requires no additional remediation cost; however, maintenance costs include pumping costs (approximately $280,000 annually) to maintain Par Pond at the 181-ft level and a remedy review every five years (estimated at $280,000 over a 30-year period) for a total present worth cost of approximately $4,600,000 over a 30-year period. Alternative 2 requires costs for pumping to maintain the water level at 200 ± 1 ft (estimated at $360,000 annually) and remedy review every five years for a total present worth cost of $5,800,000 over a 30-year period.

State Acceptance.

South Carolina as well as EPA have accepted the preferred alternative for the proposed interim action.

Community Acceptance.

Comments from the public have been incorporated in the IROD. Please see Section XI, Explanation of Significant Changes, and the Responsiveness Summary for details.

IX. Selected Remedy

Alternative 2 is the preferred interim action alternative. Alternative 2 consists of restoring and maintaining the water level in Par Pond to the 200 ± 1-ft level following repair of the Par Pond Dam. As a result, exposed sediments would be submerged under a layer of water. The water layer would provide a reduction in risk due to attenuation of radiation and would preclude contaminated sediments from becoming airborne. The ecosystem of Par Pond would eventually recover to essentially pre-drawdown conditions following implementation of Alternative 2.

Within 15 days of the signing (approval) of the IROD, SRS will submit an outline for the post-IROD documents; the Remedial Design/ Corrective Measures Design and Remedial Action/Corrective Measures implementation Plans. The post-IROD documents will be submitted within 30 days after the outline is approved by EPA and SCDHEC. The interim remedial action will begin after the post-IROD documents are approved.

X. Statutory Determination

This interim action remedy is protective of human health and the environment, complies with Federal and state applicable or relevant and appropriate requirements directly associated with this action, and is cost-effective. This interim remedial action utilizes permanent solutions and alternative treatment (or resource recovery) technologies, to the maximum extent practicable, given the limited scope of the action. Because this interim remedial action does not constitute the final remedy for the Par Pond unit, the statutory preference for remedies that employ treatment that reduces toxicity, mobility, or volume as a principle element will be addressed by the final response action. Subsequent actions are planned to fully address the principal threats posed by the Par Pond unit.

Since this is an IROD, review of this unit and of this remedy will be ongoing through implementation of the Remedial Investigation and Feasibility Study process required in accordance with the terms of the FFA as DOE, the EPA, and SCDHEC continue to develop final remedial alternatives for the Par Pond unit.

XI. Explanation of Significant Changes

Comments received during the public comment period suggested that SRS should not maintain the pond at full pool but let it fluctuate naturally. The reasons expressed for this option were cost and the incompleteness of the data available to determine the actual/potential risk of the waste unit.

Based on the impact from the public and discussions with the regulatory agencies, the preferred alternative (Alternative 2) outlined in the IAPP is being modified by this IROD to include refill and maintenance of the pond at 200 ft msl ± 1 ft until a National Environmental Policy Act (NEPA) evaluation of this modification alternative can be evaluated. Once the NEPA documentation is completed and assuming the proposed action is acceptable, SRS will allow the pond to fluctuate naturally until the final CERCLA action is complete.

DOE is required through NEPA regulation (10 CFR PART 1021) and DOE Order 5440.1E to assess the environmental impacts of any proposed action which may potentially have significant effects on the environment. DOE is committed through the regulation to follow the letter and spirit of NEPA, fully comply with the Council on Environmental Quality (CEQ) requirements, and apply NEPA early in the planning phases of a proposed action, such as the evaluation of the potential impacts of fluctuating water levels on Par Pond. CEQ required DOE to prepare a Special Environmental Analysis to assess the impacts of the drawdown, repair, and refill back to the 200 ft. level. Additional NEPA documentation will be required to evaluate the potential

environmental impacts associated with the fluctuation of the water level from full pool.

Appropriate NEPA documentation will be prepared to evaluate the potential environmental impacts, and any associated mitigation measures, of allowing Par Pond's water level to fluctuate naturally. This proposed action would include the discontinuation of pumping from the Savannah River once the Pond has been refilled to the 200 ft. (± 1 ft) level. The NEPA documentation will focus on the potential impacts of reduced and/or fluctuating water levels on the ecology, potential impacts on the ecosystem from reduction of nutrients as a result of discontinuing pumping from the Savannah River, and assessment of the Pond's water level in balance with maintaining minimum flow in Lower Three Runs Creek. It is estimated that the NEPA evaluation will be completed in 1996 or 1997.

Based on recent studies and modeling conducted by various internal and external organizations, PAR Pond will fluctuate naturally between 190 to 200 ft. msl. This means that at different times, between 0 and 800 acres of contaminated sediment will be above the water line. The pond will loose the nutrients that have been provided from the Savannah River water for the past 33 years. While most natural lakes and ponds maintain a fairly constant level, except in extreme conditions, the equilibrium point of PAR Pond is unknown and the level will probably fluctuate more than a natural lake since the pond is man-made. Personnel access to PAR Pond sediments will remain restricted.

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APPENDIX A

RESPONSIVENESS SUMMARY

During the public comment period for the proposed interim action for the PAR Pond operable unit, a public information meeting was held to discuss the proposed action with interested members of the public. The meeting was held on December 14, 1995 in Aiken South Carolina. Approximately 35 people attended the meeting (including the SRS and regulatory agency personnel).

The public meeting was divided into three main segments: 1) a general introduction section, 2) a discussion about the proposed PAR Pond interim action and 3) a question and answer session. A transcript of the meeting is available in the Administrative Record File for the PAR Pond unit.

During the public comment period, several letters were submitted from individuals and groups regarding the proposed interim action. Questions raised during the discussion included general information questions regarding the physical state of the unit, how SRS was planning to refill the pond, dam safety issues, the accuracy of the costs and the method of determining the cost estimate, impacts (potential risks) to workers, residents and wildlife. This Responsiveness Summary addresses the general comments and concerns from the public meeting and specifically addresses the written comments received. The summary is divided into two sections: 1) general responses and discussions to significant issues raised during the meeting, including modification of the proposed action, and 2) specific responses to the written comments received. Please note, some of the specific comments will be addressed by the general response section due to common questions and concerns. Also, some comments were received about the meeting format. These comments will be taken under consideration for future public meetings.

General Responses:

! Modification to the preferred alternative: Alternative #2 - Refill and maintain PAR Pond at 200 ft (±1 ft) msl.

Some comments received suggested that SRS should not maintain the pond at full pool but let it fluctuate naturally. The reasons expressed for this option were cost and the incompleteness of the data available to determine the actual/potential risk of the waste unit. One written comment and one voiced at the meeting recommended SRS implement the no action alternative, i.e. maintain the pond at the 181 ft. msl. The written comment expressed a major concern regarding the cost to maintain the pond and the voiced comment focused on a concern for dam safety.

The preferred alternative (alternative 2) in the IAPP will be modified to state that SRS will refill and maintain the pond at 200 ft msl ± 1 ft until a National Environmental Policy Act (NEPA) evaluation of a reduced flow to Lower Three Runs creek (the creek below PAR Pond Dam), fluctuating pond water level and the ecological impacts of not continuing to provide river water, through pumping, to PAR Pond can be evaluated. If the NEPA evaluation indicates that a fluctuating water level is acceptable, the appropriate post-ROD CERCLA documentation will be prepared to support the decision.

DOE is required through the National Environmental Policy Act regulation (10 CFR PART 1021) and DOE Order 5440.1E to assess the environmental impacts of any proposed action which may potentially have significant effects on the environment. DOE is committed through the regulation to follow the letter and spirit of NEPA, fully comply with CEQ regulations, and apply NEPA early in the planning phases of a proposed action, such as the evaluation of the potential impacts of fluctuating water levels on Par Pond. CEQ required DOE to prepare a Special Environmental Analysis to assess the impacts of the drawdown, repair, and refill back to the 200 ft. level. Additional NEPA documentation will be required to evaluate the potential environmental impacts associated with the fluctuation of the water level from full pool.

Appropriate NEPA documentation must be prepared to evaluate the potential environmental impacts, and any associated mitigation measures, of allowing Par Pond's water level to fluctuate naturally. This proposed action would be the discontinuation of pumping from the Savannah River once the Pond has been refilled to the 200 ft. (± 1 ft) level. The NEPA documentation will focus on the potential impacts of reduced and/or fluctuating water levels on the ecology, potential impacts on the ecosystem from reduction of nutrients as a result of discontinuing pumping from the Savannah River, and assessment of the Pond's water level in balance with

maintaining minimum flow in Lower Three Runs Creek.

Once the NEPA documentation is completed and assuming the proposed action is acceptable, SRS will allow the pond to fluctuate naturally until the final CERCLA action is complete. The appropriate CERCLA documentation will be prepared prior to allowing the pond to fluctuate. It is estimated that the NEPA evaluation will be completed in 1996 or 1997.

Based on recent studies and modeling conducted by various internal and external organizations, PAR Pond water level will fluctuate naturally between 190 to 200 ft. msl. This means that at different times, between 0 and 800 acres of contaminated sediment will be above the water line. The pond will loose the nutrients that have been provided from the Savannah River water for the past 33 years. While most natural lakes and ponds maintain a fairly constant level, except in extreme conditions, the equilibrium point of PAR Pond is unknown and the level will probably fluctuate more than a natural lake since the pond is man-made. Personnel access to PAR Pond sediments will remain restricted.

! Cost Estimate

The costs provided in the IAPP and IROD are for performing the remedial actions - refilling and maintaining the pond and the 5 year remedy reviews. The cost includes the estimated annual pumping costs and O&M costs associated with the operation of the pumps. The cost is an incremental (estimated) cost (part of the total cost) associated with the operation of the Site Cooling Water Distribution System (river water system) that maintains water to PAR Pond, L Lake and the reactors. The river water system will remain in service, at this time, irregardless of the action chosen for PAR Pond. Therefore SRS would still incur the cost associated with the operation of the pumps. The remedial costs presented were addressed per EPA guidance. The Superfund program recommends that the present worth be calculated at a 5% discount rate (interest) before taxes and after inflation be assumed (discount rate applied prior to taxes and after inflation). The thirty year time frame is the maximum allowable per the regulations, thus resulting in the maximum cost estimate (OSWER 9355.3-01 pg. 6-12). It is used for estimating an comparison purposes only. A time frame of ten years could have been used. It does not mean that SRS plans to maintain this interim action for thirty years.

Present worth analysis is used to evaluate expenditures that occur over different time periods by discounting all future costs to a common base year, usually the year in which the estimate is prepared. This allows the cost of remedial action alternatives to be compared on the basis of a single figure representing the amount of money that, if invested in the base year and distributed as needed, would be sufficient to cover all costs associated with the remedial alternative. In other words, in every investment, it needs to be recognized that a dollar invested today is worth more than a dollar tomorrow because of the interest cost which is related to all expenditures which occur over time. Dollar benefits which accrue in the future cannot be compared directly with investments made in the present because of the time value of money. Discounting is a technique for converting various cash flows occurring over time to equivalent amounts at a common point in time. It is recommended by the Office of Management and Budget (OMB) that costs in future years should not be escalated to account for general price inflation, except where there is a reasonable basis for predicting differences in the relative escalation of costs (or benefits) associated with the project (i.e. if the operating costs will be increasing). Otherwise, the estimation should use constant (base period) dollars. OMB recommends a discount rate of 10%, which represents "the average rate of return on private investments, before taxes and after inflation" (OMB, circular A-94). In other words, inflation is accounted for in the discount rate:

$$P = A\left[\frac{\{1+i\}^{n}-1}{i\{1+i\}^{n}}\right]$$

P - present worth
A - annual payment/yearly disbursement
i - interest rate/discount rate

The present worth of the preferred alternative is approximately $5.5 MM. This is the present worth of $360,000 for 30 years using a present worth factor (discount rate/interest rate) of 5%. The total present worth cost also includes the 5 year remedy reviews as required by the

regulations. Present worth can be viewed as the amount of money that will be needed now in order to fund a future outlay(s). In this case a uniform series of $360K/yr. The 5% discount rate does not mean that the cost is reduced by 5% each year, it is actually increased 5% a year. Specifically, $360K in the first year is equal to $378K the second year. Using the present worth discount rate allows a comparison/evaluation the total lifetime cost(s) in present dollar value. The future value (value spent at the end of the lifetime in future dollars) is not $10.8MM ($369K x 30 yrs) but rather $23MM.

Maintaining the pond at the 181 foot level also has an annual O&M cost associated with it. In order to maintain the pond at 181 ft. discharging of water from the pond is required. Also, at times some pumping (and discharging) is required to maintain flow to Lower Three Runs. The river water system is being maintained to pump and discharge water from PAR Pond to maintain the lower water level and also to provide water to L Lake and other systems that use the water. It was estimated from the operating department, that it takes a slightly less level of effort to maintain the pond at 181 ft. than at full pool. The cost to maintain the pond at the 181 foot level was estimated to be $280,000/yr.

The annual $360K/yr. O&M cost to maintain the pond at full pool is the best estimate available from the operating department. This is what has been budgeted. This figure may vary annually depending upon pump usage. During the initial refill, the cost could be as high as $500K to $700K, depending upon pump usage (average pumping rate versus maximum pumping), natural inputs, maintenance problems etc.

By the same token, the annual cost could be lower if it is a wet year. This annual cost is part of the normal annual operating budget for river water system. If this CERCLA action had not occurred (i.e. drawdown and refill), these moneys would be spent maintaining the pond regardless.

This analysis can also be used to support the proposed change to the preferred alternative. The best way to minimize the costs would be to eliminate pumping and/or siphoning. In other words, letting the pond fluctuate naturally. No true cost saving, though, would be realized until the Site Cooling Water Distribution System (river water system) is completely shut down.

! Verbal comment from the meeting: Mr. David Christianson - "...it appears to be that we drew own the water to its current level in order to repair the dam, that its present low level is more of a stable condition than full pool. And, in that case, it would appear to me that the cheapest, most cost effective scenario to maintain the PAR Pond at that depressed level while we are doing other studies to determine its configuration. And that is -- that's all I really wanted to say, that it appears to me that it's a stable configuration right now, more stable than if it were full, and I believe that we should maintain it at that until we determine its ultimate destination."

Response:

The design for the repair of the uncontrolled seepage problem at PAR Pond Dam was reviewed by the US Army Corps of Engineers, the Bureau of Reclamation, and the Federal Energy Regulatory Commission (FERC). All parties agreed that the designed repair would return the dam to a safe condition. The repair was completed to the specifications in the design documents. The FERC conducted periodic inspections during the construction phase of the repair. These inspections reported that the observed work appeared to be in accordance with approved plans and specifications. Their final inspection will be performed after the reservoir is returned to full pool (El. 220 ft.).

Since the repair of the dam is not part of this CERCLA action, details of the dam repair will not be added to the IAPP or IROD. For the purposes of this proposed action, the dam will be in a safe condition for refilling the pond. This is stated in the LAPP and IROD.

Written Comments Received on the Par Pond Interim Action Proposed Plan

Taxpayers for Responsible Infrastructure Management (TRIM)
Jackson, South Carolina

"TRIM is a grassroots organization devoted to the effective management of our federal lands and

resources. We believe that risk management should be utilized to focus the scarce funding for environmental restoration where it will contribute the most to the environment. We choose to participate in this process via written comments. We feel that our method of participation preserves the working relationships of our members with DOE, Federal and State regulators, and their contractors.

We have read the available material related to Par Pond, and attended the meeting on December 14th in Aiken. There are many issues that we feel compelled to comment on, and these are captured in Attachment 1.

We would like to propose and additional alternative, herein referred to as "Alternative 3", to be considered: fill the pond, and let the level vary with rainfall just like a natural lake. Attachment 2 is a draft of proposed Alternative 3. We believe Alternative 3 is safe, protective of both man and beast, and is far more cost effective based upon the following logic:

! The exposed sediments contain 9 curies Cesium, which is by far the worst hazard to hman or creature. The exposure to workers during the period the pond was drawn down was so small, the radiation monitoring was not required. A linear correlation of exposure vs. exposed sediments is conservative, based upon the stated fact that the worst areas of contamination are in the deeper sections of the pond. This is somewhat offset, however, by the fact that exposure of sediments is the greatest with the first few feet of level decrease due to the slope of the shoreline. On balance, it appears that the risk in Alternative 3 would be an order of magnitude less that with alternative 1 (pond at 181'), and very close in magnitude that of Alternative 2.

! No evidence of harm to wildlife from uptake of Cesium or mercury was observed with the pond at 181'. The vegetation uptake is proportional to the quantity of foliage growing in the contaminated sediments; with Alternative 3, the amount of foliage growing in the contaminated sediments will be essentially equal to that of Alternative 2; the foliage will not be able to establish itself in an area of varying water level.

! The uptake of contaminants is also proportional to the area of habitat established on exposed sediments on which the nonvegetative food chain exists. The area of habitat established on exposed sediments under Alternative 3 is, if anything, less than that of Alternative 2.

Therefore Alternative 3 presents no substantial difference in risk than Alternative 2. It also satisfies all the expressed concerns of the regulators and the public (excepting the earthen dam concern), and is far more cost effective.

Should EPA disagree with the merits of our proposal, we would urge you to consider this proposal from a risk management perspective; we find that the exposed sediments at Par Pond present insufficient risk to warrant the expenditures proposed. The sediments were exposed for the last three years, without evidence of harm; surely what is prudent is to let the pond level vary with rainfall until more data is collected, if EPA indeed feels that this is indeed warranted.

In the event that the EPA feels that there is insufficient data to justify the exposure due to varying water level, perhaps the interim action should include a provision that once further assessment of risk is complete, the pond will be allowed to vary. This would eliminate the need to develop another interim plan (the cost of which never appears in any discussion of alternatives).

We encourage you to give this proposal consideration as the preferred alternative.

We would like to request the comment transcript or summary from the December 14 public meeting, and copies of all written stakeholder comments as well. Thank you for inviting us to participate in this process, and please keep us on the distribution for future correspondence. We look forward to your response."

Response to TRIM Letter:

Based on public input on the proposed action for PAR Pond, the preferred alternative will be modified to state that the pond will be refilled and following a required NEPA evaluation, the pond will be allowed to fluctuate assuming the NEPA evaluation supports this action. See the first general response. Note that a new alternative, alternative 3 as proposed, is not needed

to implement the change. The existing preferred action can be modified without developing a new alternative within the current CERCLA documentation.

SRS believes TRIM's letter was well presented and thought out. However, there are some slight inaccuracies that need to be clarified. Although the statement that the risk to workers during the drawdown was negligible is correct, the risk evaluation based on existing data indicated, based on a modified standard worker scenario, that personnel working on the sediments could be at risk due to exposure. The standard default EPA values for risk assessments, which are conservative, were modified to reflect actual site working conditions. Currently worker access to the sediments is controlled and monitored and minimized. It is correct, as stated in the meeting, that workers are not required to wear radiation monitors. However, this is not because that the potential risk, as calculated, is low, but because the exposed sediments do not meet the definition of a radiological controlled/contaminated area. There are specific guidelines specified by DOE as to when monitoring inside a contaminated area is needed. These are different than risks calculated under CERCLA.

The existing estimate of worker risk is based on limited data. In order to gain an accurate estimate, more data would be required. A new evaluation may indicate there is a different risk that originally estimated. Based on the information available, the DOE, EPA and SCDHEC are being protective of human health and the environment by being conservative and recommending the refilling and maintaining of the pond, to reduce the potential risk, until more information becomes available.

Although there is no evidence of harm to wildlife from uptake of CS-137 or mercury there has been a noticeable increase in the uptake of cesium in some of the animals and vegetation on the sediments. The uptake levels have not yet reached a dose level where harm to wildlife will occur. The longer wildlife is exposed or can be exposed to the sediments the greater the uptake of contaminants will be and the greater the risk of physiological harm becomes. Wildlife monitoring will continue. Also, some of the nutrients supplied from the river water displace the uptake of CS-137 and mercury in plant and animals. Potassium is one of these nutrients.

Therefore, by adding river water to the pond, SRS is reducing the possibility that the uptake levels may reach an unacceptable level.

1340 acres of aquatic habitat was lost (loss of the entire littoral zone) during the drawdown. The impacts from the drawdown are currently more visible than those associated with the contaminants in the sediments. Effects of the drawdown were utlined in the IAPP.

All comments received, as well as the meeting record will be placed in the Administrative Record File for the PAR Pond waste unit. If possible, copies will b sent to TRIM.

TRIM Comments on the Par Pond Interim Action Proposed Plan

"1. The agencies involved do not fulfill the need for public participation in this process, because the are still in the Decide-Announce-Defend mode rather than seeking a Win-Win solution. Some regulators hide behind regulations, and when defending the proposal indicate that 'the regulations require such and such'. No one argues the need to comply with our laws and regulations. In many cases the laws and regulations require issues to be addressed, but do not specify how they are addressed. Thus when the public comments, the responders should ask themselves, "how can I accommodate this stake holder within the constraints of the regulations?" rather than explaining how the regulation constrains them.

The best example of this was the discussion of alternatives. The regulators limit discussion to the alternatives being proposed, while other alternatives may be available that address the stake holder issues and comply with the regulations. The agencies do not solicit solutions from stake holders we never hear "how could we accommodate this concern within the constraints of the regulations?" The alternative that we present in this memo could have easily come to light with proper facilitation.

From the information presented, three concerns were identified by EPA, DOE, and the Public; 1) risk to human health; 2) risk to the environment; 3) cost effectiveness. The following comments address each of these concerns."

Response:

Additional alternatives proposed by the public are always considered. However, the IAPP only proposed 2 actions and that is what was presented to the public. Under the RCRA/CERCLA process, upon receipt of public comments, the alternatives are reviewed to determine if the option chosen is still the preferred alternative. DOE has discussed the Par Pond IAPP with some stakeholders on numerous occasions. The Natural Resource Trustees were given two or three briefings on the proposed alternatives. Several briefings were given to EPA and SCDHEC at quarterly meetings. A public meeting was held in Aiken where Par Pond was discussed in great detail, prior to the development of the IAPP.

As a result of the Public meeting held on 12/14/94 and comments received at that meeting, DOE is proposing to refill and maintain the reservoir until the NEPA process has been complete. NEPA will consider the ecological and other possible impacts of allowing the PAR Pond water level to fluctuate naturally. Should this alternative have acceptable environmental impacts it will be pursued. Therefore in this case, public participation helped DOE and EPA concur with the selection of the alternative proposed in the TRIM letter.

"Human Health Risk

2. The documentation clearly states than the situation at PAR Pond does not present a risk to the general public. Therefore, the IAPP does not need to address this topic. The risk to a hypothetical resident is reportedly greater, so the regulation requires that this be addressed. Given the fact that this is an interim action, and that residence of PAR Pond is not a reality in the near future, the IAPP should simply conclude that prior to establishing anything greater than worker exposure to PAR Pond, that an appropriate analysis be conducted at that time. Anything further would be a great waste of taxpayer dollars."

Response:

SRS agrees with the comment. Since this is an interim action and not a final action, the IAPP did focus on the immediate problem and not the potential of a future resident. The first revision (version) of the IAPP did present alternatives that focused on more permanent solutions to the problem, but was modified based on EPA comments similar to TRIM's. The risk assessment, based on limited existing data, did evaluate the future resident scenario as required by CERCLA guidance, however, for the purposes of the IAPP an attempt was made to focus on the current potential risks. The final CERCLA action will focus on the hypothetical future resident, depending upon future land use decisions, as well as the other required scenarios.

"3. The risk to the worker was identified as 'moderate', with a numerical value assigned of 10-4 to 10-6 chances of an additional cancer per year. The calculation that arrived at this figure was undoubtedly very conservative, due to the lack of hard and fast data. The risk identified was due to the radiation in the sediments exposed in the drawdown. It was also pointed out, however, that radiation monitoring is only required for workers if the dose exceeds 100 millirem (per year?). If this is the worst risk to human health, one can only conclude that the risk to workers is negligible, since it is clearly less risk than that of many site workers who do have to wear radiation monitoring. We feel that sufficient data is available to support the position that with the pond at any water level > 181' there is no appreciable risk to the workers."

Response:

The guidelines that determine when radiation monitoring is required are different than these that axe used to calculate and estimated risk under CERCLA. DOE and the NRC regulate when radiation monitoring is needed. Radiation monitoring, as well as designating an area "Radiologically Controlled or Contaminated", is determined by internal procedures that follow DOE guidelines. Although PAR Pond workers are not required to wear radiation monitors; this does not mean that there is no risk to the workers present. It means that it does not meet the definition of a radiologically controlled area. The risks determined by CERCLA are based on a different set of conditions. As stated previously, the default conservative EPA parameters were modified for the worker scenario to reflect actual site conditions. If the standard conservative EPA parameters were used, the risk would probably have been estimated in the area of 10-2 excess cancers per year.

The radiation limit for formally trained radiation workers at the Savannah River Site is currently 3000 mrem per year. The radiation limit for members of the general public is 100 mrem/year and it is that limit that is applicable to workers on the Par Pond CERCLA unit. Three independent estimations of the radiation dose received by full-time workers at Par Pond (8 hr/day for 250 days per year) showed that the potential dose rate is in the range of 16 to 22 mrem/yr. Consequently, personal monitoring devices are not required by workers on Par Pond, but are available if requested. No special protective clothing is required for entry to the Par Pond unit, but it is recommended that workers wear rubber boots and gloves to minimize direct contact with the sediments and facilitate cleaning.

The existing estimate of worker risk is based in limited data. In order to gain an accurate estimate more data would be required. A new estimate may modify the risk that was originally estimated. In order to minimize any risk, actual exposure to the sediment is controlled by limiting worker access. Based on the information available, the DOE, EPA and SCDHEC are being protective of human health and the environment by being conservative and recommending the refilling and maintaining of the pond, to reduce the potential risks, until more information becomes available.

"4. We find it ironic that the exposure of the workers to the sediments poses the greatest actual risk, yet no monitoring of the workers is required. Of all the money spent on quantifying the risk, DOE is unable to quantify the actual exposure of the workers, nor compare their exposure to other workers. How can they call it a real risk; and yet not attempt to quantify it?"

Response:

The DOE has initiated several sampling and monitoring programs to better assess the radiation environment of PAR Pond. Most of these data are not yet available. Please see #3 and the response to the letter.

"5. The risk to the environment was not clearly stated, however it was stated that no ill effects due to the exposure/uptake of either radiation or mercury has been observed in the three years the pond was down. The EPA indicated that their primary driver was to protect the species in the area. Given the fact that no adverse impacts have been observed in three years, we feel that their money would be better spent studying other areas at SRS."

Response:

Although there is no evidence of harm to wildlife from uptake of CS-137 or mercury there has been a noticeable increase in the uptake of cesium in some of the animals and vegetation on the sediments. The uptake levels have not yet reached a dose level where harm to wildlife will occur. The longer wildlife is exposed or can be exposed to the sediments the greater the uptake of contaminants will be and the greater the risk of physiological harm becomes. Wildlife monitoring will continue. Also note that 1340 acres of aquatic habitat was lost (loss of the entire littoral zone) during the drawdown. The impacts from the drawdown are currently more visible than those associated with the contaminants in the sediments. Effects of the drawdown were outlined in the IAPP.

"Risk to the Environment

6. After further discussion of who (humans or habitat) were at risk due to the lower pond, level, it was stated that the risk was not indeed a driver for the refill, but rather the only driver was the restoration of the pond as an ecological resource. The SREL person itTdicated that Par Pond is a source of study on threatened and endangered species; that the drawdown had devastated an invaluable wildlife sanctuary; that the population of ducks was vastly reduced; and finally that the environmental quality could only be restored by refilling the pond. We believe that the value of the pond as an ecological resource is valid, however we feel that scientific research should be funded based upon it merits, not by blackmailing the regulators and DOE (who hold the taxpayers checkbook) with the suspicion of harm to the environment."

Response:

DOE and EPA agree that there is a potential long-term risk to both human health and the ecology

from the exposed sediments. Ecological receptors can be more sensitive than human receptors and the risks are often difficult to quantify. However, it the potential risk associated with the exposed sediments that is driving DOE to refill the reservoir. The value of the ecological resource is an added benefit, but not one of the criteria for selecting the proposed alternative.

"7. We also believe that it is faulty science to claim that the diversity of the wildlife habitat is a result of 30 years of isolation, and that this is a "natural" habitat; this neglects the fact that for 30 years the government has pumped nutrients to the pond that otherwise would not have been there. Surely anyone with a few billion dollars could create a similar habitat for study."

Response:

Comment noted.

"Cost Effectiveness

8. The cost estimates provided were bogus at best, and the assertion that the preferred alternative is cost effective is ridiculous. A response to this comment that 'the regulations required that this methodology be used' is another representation of comment number one. What we would like to see included is a cost estimate that has at least a shred of credibility (you can also include the regulatory required' version to satisfy the regulators)."

Response:

Please see the general response to the cost estimate. The cost estimate is as accurate as possible and is presented in an industry accepted format.

"9. The following non-conservatism's were observed in the cost estimate:

- Using a 5% reduction in cost each year is absolutely ridiculous - use a minimal inflation rate instead - like 2% in the other direction.
- The $360,000 estimate was called an incremental cost: did this represent all the costs involved or does it represent the added cost of pumping?
- The cost estimate does not include the whole path forward - like one member of the public stated, we are jumping on a train, but no one knows where the train is headed.
- DOE stated that they intended to pursue another interim action to allow pumping to stop - if that is the case, then this IAPP should include the cost of preparing a second IAPP in the estimate in order to fairly represent the cost of this alternative."

Response:

Please see the general response to the cost estimate.

The 5% discount rate is not a reduction in the estimated annual cost but a way of measuring the time value of money. It includes inflation.

The $360K/yr. represents PAR Pond's part of the operating cost for the river water system.

The cost estimate does not and should not include the cost for the "whole path forward" or the cost of preparing another set of CERCLA documents for a yet to be determined action. These costs would be impossible to estimate since the scope of any future action is unknown at this time. The "whole path forward" for PAR Pond is dependent upon many other factors besides the current CERCLA action or any future CERCLA action (see page 1 of the Responsiveness Summary)

Letter from Mr. G. J. Phillips to the EPA

Mr. John Hankinson
Administrator
U.S. EPA, Region IV
345 Courtland Street
Atlanta, GA 30365

Dear Mr. Hankinson:

The reason for this letter is the public meeting I attended in Aiken, S.C. concerning the Interim Plan for Par pond. I am not writing to Mr. Crane, who represented your agency, because he does not have the authority to stop this wasteful project and also because Mr. Crane made it quite clear at this meeting that he had made up his mind that he was going to approve refilling the pond. I submit to you that he is a public servant and is required to listen to the voice of the people. Four people asked questions, and three of those four people were of the opinion that this project was unnecessary. Another person responded that he worked for the ecology laboratory and that it was necessary to fill the pond for the ducks, I would go along with this logic if it weren't for the fact that Savannah River is a closed site and that it is not open to the public and therefore the citizens of the United States do not benefit from being able to see these beautiful birds. However, these birds have migrated to surrounding lakes where they are enjoyed by all.

I am writing to you to request that your agency implement alternative I, which is no action at all for the following reasons:

1. There is no danger to human health, the animal population, fish, and ecology as pointed out by Westinghouse personnel at this meeting. However, Mr. Crane stated that there was a threat to the ecology. I went on record to ask Mr. Crane how he knew more about the dangers at SRS than the people who monitor the site daily. I also entered into the record information contained in the Savannah River Environmental Report for 1993 Summary Pamphlet that there were no dangers based upon the hypothetical individual who receives the maximum exposure from all pathways. (See Appendix A). This report further goes on to compare the maximum dose from SRS releases, both airborne and liquid, to the applicable standard and the releases never exceeded the applicable standard. (See Appendix B) The Sportsmen's Doses (See Appendix B, page 16) shows that 1,553 deer and 147 hogs were taken from the site and none of them has appreciable doses of cesium that required them to be taken from the hunters. This entire report is full of information as to why filling the pond is unnecessary, even though the hypothetical models were worst case scenarios.

Response:

SRS CERCLA units are evaluated with respect to both onsite and offsite risks associated with individual operable units. In contrast, data presented in the SRS Annual Environmental Monitoring Report (WSRC 1994) predominantly represent the cumulative risks associated with all SRS operations to offsite individuals and populations. These doses are associated with atmospheric and liquid release (e.g. stream) pathways. Additionally, potential doses related to the consumption of deer and hogs taken during the SRS public hunts are calculated. The analyses presented in the Annual Environmental Monitoring Report indicated that the radiological doses associated with SRS operation are minimal, and confirm the Par Pond CERCLA unit specific predictions that were presented in the Baseline Risk Assessment Using Existing Data for Par Pond (BRAEDPP: WSRC 1992). Additional pathways, such as the resuspension and offsite transport of contaminated soil particles, were considered in the BRAEDPP; these additional evaluations also indicated that the risk to offsite populations and individuals from the Par Pond Exposed Sediments was within acceptable ranges.

The risk assessment under CERCLA (BRAEDPP) also included evaluation of the risks to trespassers into the unit, SRS workers working on the unit, future residents and organisms inhabiting the area. The BRAEDPP identified risk at, or higher than, the 10-4 threshold for the future Par Pond worker, and the future Par Pond resident, as well as potential risk for several components of the ecosystem that were evaluated. Under current use scenarios, risks of 10-6 or higher were calculated for the Par Pond worker, but not the trespasser. The available data indicated that ecological components may also be at risk by occupying the exposed sediments. Additionally, data

collected by the Savannah River Ecology Laboratory (SREL) after completion of the BRAEDPP indicated that Cs-137 uptake by from soil to plants is higher than assumed in the BRAEDPP, thereby potentially increasing the risk from the exposed sediments. Because there are no current residents at Par Pond, that scenario was not evaluated.

Thus, the two documents are not in conflict. Both documents conclude that there is no unacceptable risk to offsite individuals, while risks to individuals and organisms directly encountering the exposed sediment unit at Par Pond are above the threshold criteria.

"2. The cost data in the report is incorrect. Westinghouse never got to discuss the cost data although I raised several questions about the validity of the information. It was as if Mr. Crane and Westinghouse did not want to discuss this information. However I find it suspicious that after the meeting adjourned and we were no longer on record, that Mr. Clark and his assistant came up to me and started a conversation. I asked him if he thought that the $5.5 million life cycle cost was correct, because when multiply 30 years by $360,000 a year your result is $10.8 million. Mr. Crane stated, off the record, that there must be a mistake and that Westinghouse should have added 5 percent each year. Once again why did he have this discussion with me off the record. I suggest to you that the public is not being told the true cost of the project and EPA and SCDHEC are condoning these inaccuracies by not ensuring that the information in the IAPP is correct. I also find fault with the estimate because there is no escalation for inflation."

Response:

Please see the general response to the cost estimate. There was no mistake in the calculated present work cost.

"3. It is the responsibility of EPA to make sure that there is a significant risk to the public first and the animals last before you require DOE to spend money that is needed elsewhere. We have such a significant risk at the Site, the deterioration of plutonium storage containers, and it will endanger the lives of the workers as well as the ecology. (See Appendix C) Let's put the money where it is most needed especially since Secretary O'Leary is talking about cutting billions from the budget for environmental remediation. Please act responsibly and say no to the pond so that this money can be used to protect 20,000 human lives at the site."

Response:

Please see response to comments #3, 4, 5, 6 (TRIM comments) on pages 8-10 of the Responsiveness Summary.

"I believe the three reasons given above are sufficient to choose alternative one or have another public meeting and present the true facts. Although I believe the second alternative is a waste of the taxpayers dollars. Further, I believe that Alternative I meets all the criteria stated in the IAPP page II-2.

Another matter that I wish to bring to your attention is that Mr. Crane assured me that there would be a public meeting on SRS's Groundwater treatment plans, although the announcement (See Appendix D) says that a meeting will be held only if the public requires it, because I requested one. I have not seen this plan yet but will request a copy of it for my review. Mr. Rash from SCDHEC also gave me the assurance that a public meeting will be held. Please let me know by December 27th when you plan on scheduling this meeting. Look forward to hearing from you and Mr. Crane."

Response:

Comment noted. Alternative 1 does not meet the required criteria (9 criteria). This is stated in sections IV.C and IV.D of the IAPP.

Letter from Mr. F. Ward Whicker to the EPA

"RE: Interim Action Proposal Plan for the
Par Pond Unit (WSRC-RP-92-1170)

I wish to register public comments on the Interim Action Proposed Plan for the Par Pond Unit:

1. I strongly support preferred Alternative 2, refilling and maintaining Par Pond to the original 200 ft. level.

2. I support Alternative 2 because it is:

    a. The least costly alternative.
    b. The most environmentally-sound alternative.
    c. The most timely action to reduce human health risks.
    d. Very feasible since the dam has already been repaired

3. I support the pumping of Savannah River Water to fill and maintain the level of Par Pond.

4. I support pumping of Savannah River Water to fill and maintain Par Pond because:

    a. It will restore lost nutrients which will reduce the biological mobility of the main contaminant, 137Cs.

    b. The nutrients are crucial to the full biological recovery of the ecosystem.

    c. The pumping will be required to prevent fluctuating water levels that would periodically expose large areas of contaminated sediments.

    d. Fluctuating water levels have been shown elsewhere to enhance the methylation rate of mercury, leading to higher uptake in fish and waterflow.

    e. Periodic pumping will have similarly positive ecological benefits and reduce contaminant mobility in other portions of the water distribution system. Examples are Pond 2, Pond 5, Pond C, and the Canal itself. Furthermore, the maintenance of the water distribution system is crucial to the maintenance of L Lake, a large reservoir that is also of immense ecological value.

    f. While the costs of pumping and maintenance are significant, the ultimate costs of not pumping are likely to be far greater because of regulatory requirements for site characterization, human health and ecological risk assessments, and likely remedial actions that would ultimately be necessary under current risk guidelines.

I respectfully request that these comments be duly registered and considered in your deliberations."

Response:

The comments presented in the letter have been noted and supports the preferred alternative. SRS concurs that at this time, alternative 2 is the most cost effective and protective alternative.

Letter from Mr. S. Booher to A. B. Gould, DOE

"Subject: Public Comment on the IAPP

Dear Mr. Gould,

Having read your IAPP. I have no personal objection to your Alternative 2.

However, no where in the IAPP did I see you address the subject of On Going Studies at the Savannah River Ecology Lab.

REQUEST: I request that you investigate the current studies being conducted of Par Pond to insure that there at NO studies on going that would be negatively impacted by Alternative 2. A statement to this effect needs to be added to your Proposed Plan.

If you find there are studies then this needs to be a part of the decision making process.

If you find there are studies then this needs to be a part of the decision making process.

You may wish to delay your Alternative 2 until these studies are completed."

Response:

Comments in the letter have been noted. Although the research that has been and is being performed on the sediments is valuable in it's own right; the research being performed on the exposed sediments is out of the scope of this interim action, unless it directly effects the CERCLA action. Any studies being performed on the sediments are temporary in duration; i.e. as long as the pond level is down the studies can continue. However, most of the studies can continue after the pond is refilled. Few require the lower water level. The temporary nature of the drawdown has been known since it was initiated. Many of the current research programs were initiated as a result of the drawdown, while others are continuations of work begun before the drawdown. Refilling the reservoir will create other research opportunities.

Letter from Mr. E. F. Girardeau to the EPA

"SRS Remedial Project Manager
U.S. EPA, Region IV
345 Courtland St.
Atlanta, GA 30365

Dear Sr.,

I attended the meeting last night, December 14, 1994, concerning the PAR Pond Interim Action Proposed Plan. Following are my comments.

I felt that the material concerning the situation was well presented and questions of importance answered satisfactorily. From a personal opinion standpoint, I feel that the water should be returned to the 200 ft. level. By doing so 1340 acres of sediment would be covered and eliminate the potential problems that could come from the huge amount of sediment - problems to humans as well as wildlife. Why leave something exposed that may or may not be safe? Let's go the safe way be covering it with water since other methods are too expensive.

My interest is because I am an owner of a hunting club approximately ten (10) miles from PAR Pond. We primarily hunt ducks which we have suspected roost at PAR Pond. This was confirmed last night by Dr. Brisbin (Savannah River Ecology Lab) who described PAR Pond as holding more diving ducks than (Lake Murray, Santee, etc.) any holding area in the state of South Carolina. He stated that the numbers have been cut considerable since the pond was brought down in 1991. During this period the ducks that we have had have been reduced more than half. This, of course, is our concern. It was refreshing to hear from Dr. Brisbin that the ducks are safe to eat since this is a concern of our hunters.

The only suggestion that I have to improve your meetings is to put a limit on how long one person can address the group. Last night one person read meaningless numbers from a previous report that was not available to the rest of us and it was evident to me that the purpose for his being there was to bash EPA.

Then the lonely little man from Augusta, a professional "letter to the editor" type, talked for 15 or 20 minutes with a goal to protect the people of Savannah when in reality he needed to be heard for his own ego. These types hold down participation of the general public.

I appreciate having the facts furnished at this meeting and hope that the action taken will be to bring the water level back to a full 200 foot level.

Edward f. Girardeau"

Response:

The comments in the letter have been noted and support the preferred alternative.

Letter from Mr. Todd V. Crawford to the EPA

"SRS Remedial Project Manager
U.S. EPA, Region IV
345 Courtland Street
Atlanta, GA 30365

Ref: Interim Action Proposed Plan for PAR Pond

Dear Sirs:

I believe that the action to be selected should be between the two suggested alternatives (SRS Environmental Bulletin, Vol. 5, No. 26, December 1, 1994). Refilling PAR Pond to its original level of 200 feet above sea level and maintaining it there at a annual cost of about $360,000 for river water pumping can not be justified by public risk reduction. Leaving it at 181 feet above sea level can not be justified either as that would require the continual operation of systems to move water from PAR Pond into Lower Three Runs Creek During heavy periods of rain that could also cause movement of Cs-137 contaminated sediments in Lower Three Runs Creek due to large discharges of PAR Pond water into the creek to maintain the 181 feet elevation.

Instead, l believe that allowing PAR Pond's elevation to fluctuate between 181 and 200 feet with the weather is the better choice. I understand that the equilibrium level has not been clearly defined yet but the best estimates place it in the 190 to 195 feet range. This would minimize costs (although some cost would still be incurred to maintain a minimum flow in Lower Three Runs Creek). In this respect, PAR Pond would then be managed like Pond B (which also contains contaminated sediments) has been since the 1960's. A nearly constant minimum flow in Lower Three Runs Creek below the PAR Pond dam would also minimize movement of contaminated sediments in the creek and adjacent shore areas which would then be covered by vegetation. The Lower Three Runs Creek corridor is more accessible to the public than is PAR Pond. I believe that PAR Pond and Lower Three Runs Creek need to be considered as a system when minimizing possible public impacts and costs.

I look forward to receiving your response to this suggestion.

Todd V. Crawford"

Response:

The comments in the letter have been noted. Please see the general response on page 1 of the Responsiveness Summary.

Letter from I.E. Coward II to the EPA

"Mr. I. E. Coward II
Aiken, SC 29801

Gentlemen,

Par Pond at the SRS is one of the best ecological areas in the southeast for Wildlife native to the region. I highly support the refilling to its original level in order to cover and shield any exposed contaminants. Every effort should be made to decrease the short term risk to public health and the environment.

Yours Truly,

Ira E. Coward"

Response:

The comments in the letter have been noted and support the preferred alternative.